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Soil Conservation

January 1980

U.S. Department of Agriculture

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Today's Challenge in Land Use

From the Administrator

Land use patterns in the United States have generally been determined not by careful planning, but by marketplace and some political bargaining. The result has too often been exploitive and shortsighted use of the Nation's best agricultural land.

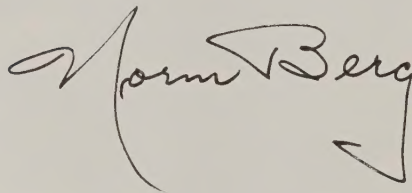
Citizens need to understand the unique character and value of land, which differentiate it from manufactured, expendable products. Land should not be "lumped" with these products and traded as just another commodity. It is an essential, irreplaceable resource crucial to man's survival.

A solution to the wasteful patterns in land use can best be achieved through the use of well prepared, publicly supported land use plans, within the coordinated framework of comprehensive national, State, and local goals and guidelines.

Rural and urban America are interwoven parts of the American fabric. We must strengthen our rural areas as we rejuvenate our major cities, in order to provide an equally attractive choice between urban and rural lifestyles.

The issue is not to "lock up" all development on agricultural lands, or to "stop growth," but to ask ourselves: How can urban development be guided in a pattern that will be responsive to the needs of the urban dweller and also protect our prime farmlands from permanent loss?

The task ahead is not an easy one. It will require the best efforts of both urban and rural citizens. All Americans must assume stewardship of their land for their immediate interest as well as for future generations.

A handwritten signature in black ink, reading "Norm Berg". The signature is written in a cursive style with a large, sweeping "N" and a stylized "B".

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Front cover:

Good land use planning balances land use requirements with land capability. This Pennsylvania community is compact and well defined, surrounded by agriculture that is free of urban sprawl, with steep slopes in trees and level or gently sloping acres in cropland.

Back cover:

Current trends in land use planning raise many questions. For example, when industry locates in farmland area, have alternative sites on less productive land been explored? Is the industry layout efficiently designed, or does it take up more land than necessary? (See article beginning on page 4.)

Disappearing Farmland: A National Concern

"The U.S. is losing one million acres of the world's best and flattest agricultural land each year to urban sprawl. In my lifetime, we've paved over the equivalent of all the cropland in Ohio. Before this century is out, we will pave over an area the size of Indiana."—Bob Bergland, Secretary of Agriculture.

"Planning to preserve . . . prime farmland is of the utmost importance, simply because feeding our people is land's most important use. . . . But what are we doing? Every day, we're losing thousands of acres of this prime farmland to subdivision, highways, airports. We're burying it under concrete or houses, and it can't be jackhammered clear again."—Orville Freeman, former Secretary of Agriculture.

"Good farm land is precious. It's what this country is built upon. And once prime land is lost, you don't go to the supermarket and buy a square foot of it."—Phillip Alampi, Secretary, New Jersey Department of Agriculture.

"It may now be asserted that for the first time in this Nation's history, each new subdivision, highway, dam, factory, power plant, or shopping center threatens permanently to reduce the productive capacity of American agriculture."—Charles Little, President, American Land Forum.

Introduction

There's a lot of talk about "prime farmland" these days, and much confusion over how important it is and what to do about the fact that we're losing it.

In their national farmland inventory, begun in 1975, the U.S. Department of Agriculture (USDA) Soil Conservation Service provides a definition for prime farmland under the umbrella term of "Important Farmlands." Important Farmlands is a general description of lands that include prime farmland and unique farmland, as defined by SCS, and other important farmlands, as defined by State and local governments.

Prime farmland is, by national standards, the best land for farming. Its flat or gently rolling acres have little or no erosion problem. In addition, prime land's soil quality, growing season, and moisture supply assure high production of food and fiber at a minimum cost.

Prime farmland is also the easiest and least costly land to build homes and businesses on. Because of this, government officials at all levels are concerned over whether U.S. farms can retain the acreage to sustain their current growth in productivity.

As our Nation expands its urban areas, it is frequently these valuable acres that are used for highways, housing, shopping centers, recreation, airports, and industry. During the last decade, America's agricultural lands have been disappearing at the rate of nearly 3 million acres per year. Scattered development by "leapfrogging" and "buckshot urbanization" breaks up and isolates additional land.

Another way to view the problem: About 90 percent of America's Important Farmlands is currently in production. This fact suggests two thoughts:

by Darwyn Briggs
and Enid Yurman

One, if our best farmlands are being converted to other uses, food and fiber production must be shifted to less productive lands. This results in decreased production per acre, increased energy and farm machinery needs, and higher prices for commodities.

Two, the fact that we have only 10 percent of our farmland in reserve reminds us that the United States is approaching the limit of its cropland "frontier." Our Nation's population is growing at the rate of 1.7 million people per year. What happens when we reach the end of that frontier?

Loss of farmland also has adverse environmental effects beyond the loss of crop-producing capacity. Open lands, including farmlands, help maintain local

water supplies by absorbing precipitation and transferring it to the ground water system. They also protect watersheds by retarding stormwater runoff and decreasing sediment damage.

American Land Use in the Past

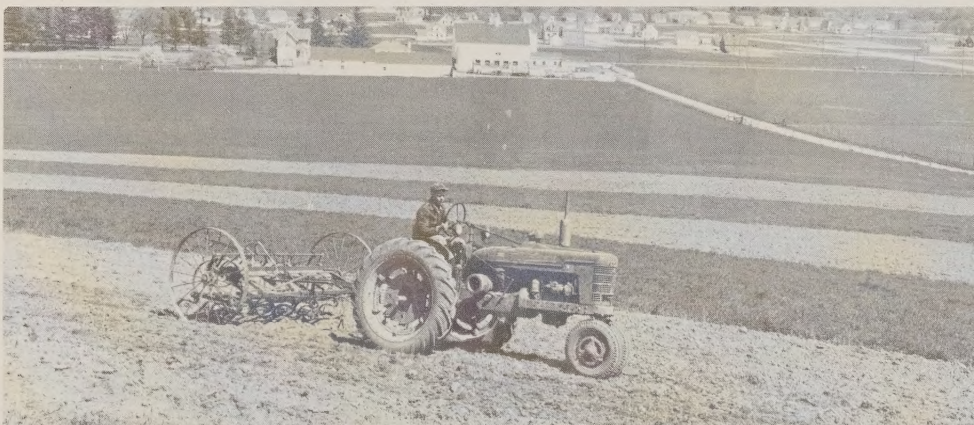
During the past 50 years, as rural America has been emptying itself into the faster-paced cities and towns, people's values have changed. Many have forgotten that the United States prospered because of the richness of its farmland. Some people are also unaware that agriculture is still the economic backbone of this country—agricultural products provide the principal means by which to combat an ever-increasing foreign trade deficit.

The American attitude on land use policy has come a full 180 degrees. From the first settlements to the early 1900's, everyone agreed: fill it up, connect it, and use it up. And why not? In those days, our Nation's horizons seemed endless.

But by the early 1930's, it was obvious to everyone that our natural resources were finite. Americans were using up the land at an alarming rate, and American farms paid the price.

Without understanding the consequences of soil erosion, farmers abused their lands. Faced with an unusual succession of severe droughts, many Great Plains farms fell victim to the tragic Dust Bowl of the "dirty thirties."

A Wisconsin farmer (top photo) prepares a seedbed for planting corn in alternate strips with alfalfa. The beginnings of urban development can be seen in the background. Ten years later (bottom photo), the farm has completely disappeared—only the buildings remain.



***"In the end, the farmland issue will have to be related back to our ability to feed ourselves and our neighbors. . . . The time for careful review of impacts and alternatives in many areas of public policy that touch land use is right now. The time for more informed land use decisions also is right now."*—Norman Berg, Administrator, Soil Conservation Service.**

In addition to the often devastating results of poor farming practices, economic factors compounded the effects of the depression on rural America. American farming was plagued by crop failures, low prices, inequities in taxation and credit policies, and shrinking rural job opportunities. Many farmers, defeated by these problems, lost their farms and began migrating to the cities and towns to make a living.

The above-stated problems to some degree have followed Americans to the present day. U.S. farms today must feed a greater number of people than in the past. However, the total land area under cultivation, as well as land readily available for farming, is declining. USDA and the President's Council on

Environmental Quality (CEQ), alarmed by these trends, have launched a major study on how to prevent further farmland losses. This study, described below, is titled, "National Agricultural Lands Study" (NALS).

National Agricultural Lands Study

The National Agricultural Lands Study (NALS) is an 18-month study of the problems caused by conversion of agricultural land to other uses. Under the direction of Secretary Bob Bergland (USDA) and Chairperson Gus Speth (CEQ), NALS is being conducted by 11 Federal departments and agencies whose programs and actions most frequently affect agricultural lands. An interagency staff has been assembled

from the participating agencies and is well into the study.

The purpose of this study is to:

- Determine the nature, rate, extent, and cause of losses of U.S. agricultural land;
- Evaluate economic, environmental, and social consequences of the losses; and
- Recommend administrative and legislative actions, if found necessary, to reduce these losses.

Between October 31 and December 12, 1979, NALS conducted 17 public workshops around the Nation. Secretary Bergland said the NALS staff was ". . . seeking information from individual citizens, public interest groups, and State and local governments on the availability of agricultural lands." Workshop participants shared their experiences and viewpoints on problems stemming from increased competition for, or actual conversion of, agricultural lands; values threatened by these changes; and ways to avoid or mitigate the most important problems cited.

NALS will submit a report to the President in January 1981. This report will provide a detailed analysis of the primary issues of the study, describe the results of the 17 public workshops, and include any recommended administrative or legislative changes needed to reduce the loss of productive agricultural lands to other uses.

Mr. Briggs is acting assistant director for land use coordination, Office of Environmental Quality, USDA, Washington, D.C. Ms. Yurman is assistant editor, *Soil Conservation*, SCS, Washington, D.C.



Highway construction consumes a considerable amount of land—an interchange may use as much as 80 acres—and often breaks up a farm, making it difficult to move farm equipment from one field to another. In such a situation, a farmer might have to reorganize the farming system and reestablish conservation practices.

Primary Issues of the National Agricultural Lands Study

The NALS is focusing upon seven primary areas of investigation:

1. Agricultural Lands in National and International Perspective. America's agricultural land base is a major domestic resource of great value to our economic and national security. It is also a resource on which the entire world is becoming increasingly dependent. This study will describe and quantify the domestic and international contributions derived from U.S. agricultural land.

2. America's Agricultural Land Base. A thorough assessment will be made of existing inventories and studies on agricultural resources. This information will provide baseline data describing the amount of land suitable for, and available to, agriculture.

3. Demands on Agricultural Land. Various categories of demands for land will be defined along with the degree to which they compete with agricultural uses. Recent shifts in land use will be identified along with indicators of possible future trends.

4. The Allocation of Agricultural Lands Among Competing Demands. Land that is well suited for agricultural use is often equally well suited for other land uses. How the land is used, and who owns it, is determined by a variety of allocation processes. This section addresses the fundamental issue of whether these processes allocate agricultural land among competing uses in a satisfactory manner.

5. State and Local Actions Affecting Agricultural Land Availability. Most State, county, and local communities have initiated programs to stop the conversion of agricultural land to other uses. These programs include many different approaches, such as: zoning, purchase of agricultural easements, and various tax assessments and tax differential schemes. This study will analyze the effectiveness of these programs in terms of overall costs, administrative problems, political considerations, and landowner equity. The results will be presented in a handbook designed for use by State and local officials.

6. Impacts of Federal Programs and Policies on Agricultural Land Availability. The Federal government, with its numerous programs and policies, has a

significant impact on agricultural land. For example, federally assisted highway projects, water resource development, sewage treatment facilities, and other public works projects often contribute to the conversion of agricultural land. In addition, Federal tax policies affect agricultural land use. This study will analyze the major impacts of Federal legislation and regulation on the availability of agricultural land.

7. Consequences for the Infrastructure of U.S. Agriculture. In the conversion of farmland to other uses, there are often spillover effects for nearby farms and agricultural support services, as well as social, economic, and lifestyle changes for nearby rural communities. These spillover effects can magnify the impacts of land conversion. Analyses will be made of the consequences for the infrastructure of U.S. agriculture.

Conservation Dollars and Sense

by John M. Cross

"Conservation doesn't cost—it pays!" read a slogan promoting better land use and treatment in the 1930's and 40's. But based on today's economics, it warrants a second look.

There was a time when a good conservation job, particularly on eroding cropland, would always boost yields and profits, especially on whole-field averages. You could cut production costs substantially through fuel savings by planting on the contour, for example. And you still can.

But inflation has caught up with conservation, too. Moving soil, pouring concrete, and hiring labor for conservation work can run into money. Yet, some conservation practices still cost very little and do, in fact, boost per-acre yields.

And then there's the big question—what does it cost to *not* do a good conservation job? Can we afford it? The answer is alarming.

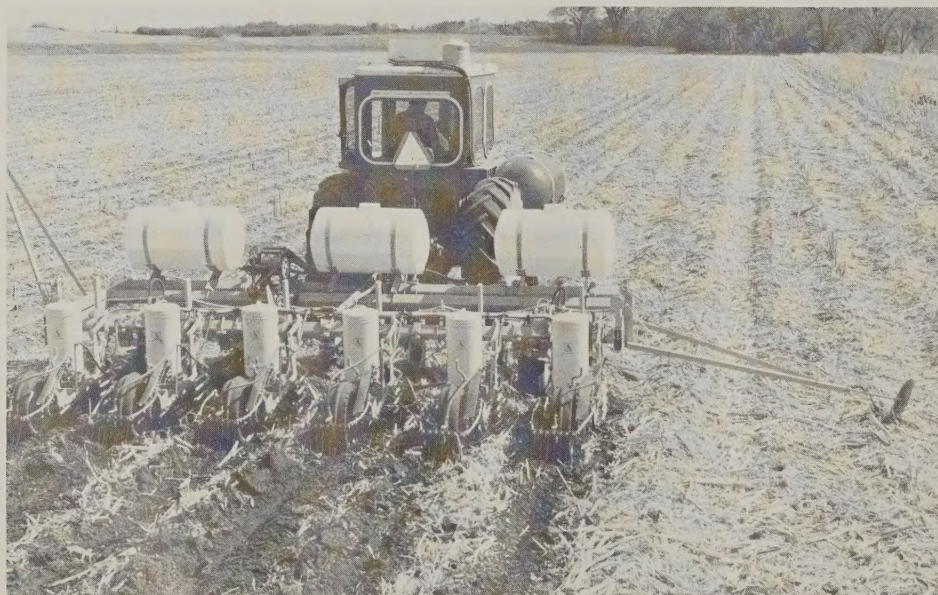
Specialists in the Soil Conservation Service's Midwest Technical Service Center at Lincoln, Nebr., have been studying conservation costs and returns. They have gathered data from each of the 12 States served by the center: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

In South Dakota, for example, data indicate that growing dryland corn on sloping land results in a soil loss of more than 5 tons per acre each year. If the land was terraced, the average cost over a 10-year period would be \$6 an acre. Deducted from a net return (income over production costs) of about \$32 an acre, this means that the cost of the terraces would eat up about 20 percent of the profits for 10 years. But then, what price can you put on a ton of topsoil? How much would soil productivity and thus profits decrease over the

long haul if you didn't reduce soil losses?

Or, look at an alternative conservation practice. Installing strip-cropping without terraces, alternating sod strips of oats or alfalfa with corn, yields a net return of \$43 an acre. But the cost of installing the conservation practice is only \$2.60 an acre. Soil loss is the same with both terraces and strip-cropping so the decision rests on whether or not a farmer can use alfalfa in his or her farm operation.

For many kinds of conservation work, the decision is whether to keep farming the land at a low net return or to invest in land treatment to protect productivity. For example, on a 40-acre field of poorly drained bottomland that yields only 40 bushels of corn or 30 bushels of oats, net returns would be nonexistent. Tile drainage with a main outlet would cost \$75 an acre annually, but yields should average 150 bushels and you



Conservation tillage costs very little and the crop residues it leaves on the land provide some of the best protection from erosion. The practice also saves fuel because it requires fewer trips across the field than conventional tillage.

could grow corn every year. Deducting the cost of drainage over a 25-year period, the net return would reach about \$75 an acre per year. Thus the land would come into full agricultural production at a lower cost per bushel.

Other effective conservation practices cost very little to install. Conservation tillage is one of these. In Ohio, SCS economists figured corn planted the conventional way and yielding 110 bushels an acre returns a net profit of \$65 per acre. If the land is chisel plowed and planted, the return would increase to \$68. No-till methods would boost the figure to \$78. The difference in profits comes from reducing machinery requirements and from fuel savings that result from fewer trips across the field.

But that isn't the whole story, and here's where conservation begins to make more sense than it costs in dollars. Crop residue left on the land by

conservation tillage methods is among the best erosion fighters. On an area of silt loam in Ohio, for example, 3,000 pounds of corn or sorghum residue per acre on the surface could put soil loss at about 2 tons per acre, which is considered tolerable. But twice that amount on the same land could reduce soil loss almost to zero. That's a target to shoot for, and the conservation practice doesn't cost a cent.

Out West, range management costs very little but pays big dividends. Once the fences and watering facilities are in, it costs practically nothing to open and close the gates to insure even grazing. Installing fences and watering facilities to make the systems work costs \$1 an acre for a section of land in Nebraska, if you spread the costs over a 20-year period. Proper grazing of the range means more beef cattle per acre over a longer period, and boosts income by about \$2.40 an acre a year. On the oth-

er side of the coin, if grass gets too short from overgrazing, the wind will whip away sandy soils in a single season.

Then there is the other extreme to the conservation cost story. Some practices run high in cost. For example, to build a set of grass backslope terraces with tile outlets on sloping Iowa land costs about \$300 an acre. It costs \$500 an acre to put in a grassed waterway instead of the tile. Farm ponds cost about \$1,500 and up. A grade stabilization structure to halt a creeping gully may cost as much as \$3,500. But if you figure how much money you save an acre in profits by protecting soil productivity and spread the conservation costs over a 20-year period, it doesn't sound so bad.

Conservationists in Iowa estimate that straight-row corn farming on sloping land results in a loss of about 2 bushels of topsoil for every bushel of



At left, planned grazing systems return more than they cost. Proper range management not only protects the soil by preventing overgrazing but also helps insure the continued productivity of pasture and rangeland. At right, grass backslope terraces with tile outlets can cost about \$300 an acre. It's an expensive practice, but it would cost more in tremendous soil losses to leave sloping land unprotected.



corn produced. Yields have been sustained in recent years only by adding more fertilizer or using new seed strains. Some experts predict we have reached a summit, a point where yields can no longer be increased much with present technology. Soil losses, if they continue, will trigger a downward trend in yields.

Erosion is dumping 200 million tons of sediment into Iowa's lakes and streams each year. In helping to clean up the country's waterways, the conservation effort has taken on new dimensions. Today's generation of landowners consider costs for land treatment to insure clean water worthwhile even though it doesn't always result in increased profits.

Unprotected soil results in erosion; erosion produces sediment; sediment is, by volume, the country's worst water pollutant. The protection and improvement of water quality have become im-

portant factors in figuring the costs and returns of conservation. How much is clean water worth to us? How much less would it cost to keep sediment out of the streams than to clean them up after they are polluted? This takes us back to the basic question: What is the cost of *not* practicing conservation?

The University of Missouri has estimated that corn yields average about 16 bushels an acre less on moderately eroded soils and 25 bushels an acre less on severely eroded soils than on comparable soils with little or no erosion. These figures can be translated into direct costs of doing nothing to prevent erosion.

All of this brings up still another question: Who should pay the costs of conservation? Traditional approaches hold that society stands to gain as much from sound resource management as an individual. That is the theory behind government cost-sharing programs. No

one seems to have come up with a better solution if, indeed, there is one.

In the light of today's economics and today's values, maybe we should rewrite the old slogan to read: "Conservation investment pays big dividends." It pays dividends in crop yields now and in protected soil productivity for the future.

Mr. Cross was head, information staff, Midwest Technical Service Center, SCS, Lincoln, Nebr., and is now retired.



Grassed waterways filter runoff, protecting water quality in rivers, streams, and lakes.

Small Family Farm Is a Way of Life

by Morris S. Gillespie

Working a small family farm is the "good life," according to Harvey McElroy of Cherokee County, Ala. Although it is a lot of hard work, he claims it is the best place to raise children.

"I was raised on this land and have farmed it since I was a boy," said McElroy. "My wife Cornelia and I have raised nine children here, and there are now four generations of McElroys in the county." McElroy's farm totals 60 acres. On a 20-acre plot he raises crops and hogs and has the family house, and on 40 acres a mile away he raises corn and soybeans.

McElroy was looking to the future as well as at the present when he built parallel terraces on 11 acres of sloping cropland. "I put in the terraces to make sure that this land remains productive for the McElroys yet to come," he said. "You see, I've got some of the best soil in the area, and I aim to keep it that way."

Not only will McElroy's parallel terraces keep his well-drained sandy loam soil from eroding, but his whole operation will be more efficient. "The gradient terraces I had before were hard to maintain," said McElroy. "Every time it rained, the water would break over them, washing away my soil and depositing sand bars. I wanted parallel terraces to protect my land and to give me long rows to farm."

McElroy was not alone in his efforts. He received technical help from the Soil Conservation Service. "We designed and laid out McElroy's terrace system, and then he built the terraces himself with his tractor," said Don Webster, SCS district conservationist in Centre. USDA's Agricultural Stabilization and Conservation Service shared the cost.

McElroy grows 20 acres of corn each year for his hogs. He keeps about 25 sows and feeds out the pigs to about 60 pounds. "I don't make much money on the hogs; but it gives me something to do, and I enjoy the work," said McElroy. "Years ago, one of my boys asked me when I was going out of the hog business. I told him, 'When you grow up!' I kept the pigs to help teach my children how to work. So many children today don't have a chance to work, so they don't know how to do anything. When my children were growing up, they hoed weeds out of the crops, picked cotton, and gathered corn by hand. We all worked together.

"And all that hard work has paid off. My four sons are in the contracting business. They're building farm ponds, terraces, and installing other con-

servation practices throughout the county. But, they still help me when I need them. As a matter of fact, they're the ones who smoothed out my old gradient terraces."

With his grandson, Joe, by his side, McElroy reflected about the plight of small family farms: "I'm really proud of the way my family has turned out, and I can't help but believe that they're happy and successful because of the things they learned out here on the farm. And, though many other small family farms are being gobbled up, we'll be raising hogs, corn, and McElroys on this farm for some time to come."

Mr. Gillespie is public information officer, SCS, Auburn, Ala.



Jason McElroy (left) discusses terrace construction with SCS District Conservationist Don Webster. Jason's father, Harvey (on tractor), a cooperator with the Cherokee County Soil and Water Conservation District, built the parallel terraces with his farm tractor.

A Special Place

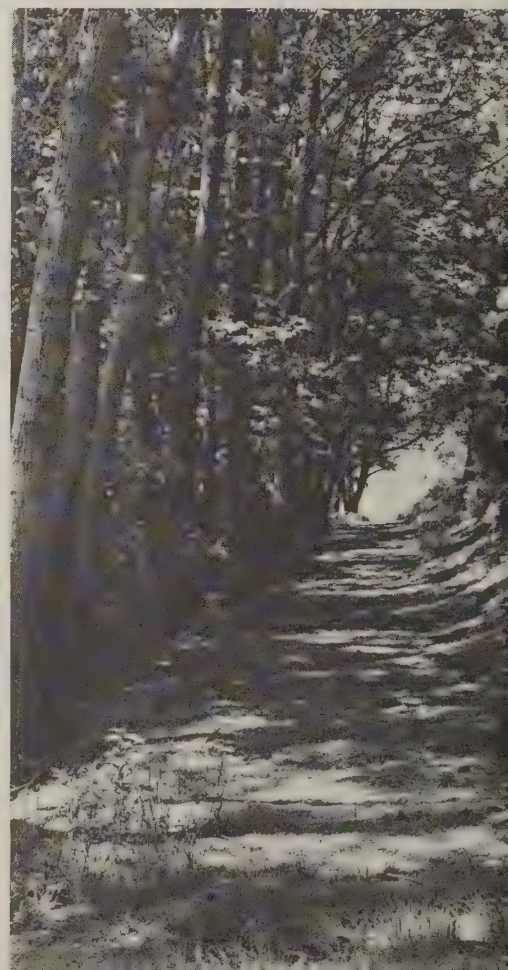


1 Most of us, from time to time, dream of our own special place, where we can just sit back and listen to Nature's music—the singing of birds and windsong in tall grass.

People in the town of Van Etten in Chemung County, N.Y., discovered just such a special place. The people felt strongly that their local marsh was a unique and valuable resource. So, they embarked on a program of improvements designed to make the marsh more attractive to wildlife and at the same time increase opportunities for public enjoyment of the area.



2 Water levels in the marsh varied sharply from season to season, and the area was without surface water most of the summer. To provide year-round open water for fish and waterfowl, the Soil Conservation Service designed a system of level ditches and potholes.



3

To provide nesting areas for the wood-duck population, the town installed 10 nesting boxes. Sixty loafing logs were also placed to encourage wildlife usage of the marsh.

4

The New York State Department of Transportation built a parking lot for visitors to the marsh. Comprehensive Education and Training Act employees built an access stairway and nature trail so that people could enjoy the marsh and adjacent upland without disturbing wildlife and damaging its habitat.



5

Financial support for the marsh project was important to its success, with the local Federation of Sportsmen's Clubs donating \$2,000. But, local feeling for the marsh is the real story.

A few years back, stories were told of a "swamp monster" in the marsh whose strange cries could be heard at night. The monster even reportedly killed a goat on a neighboring farm. When skeptics claimed that the monster was a hoax, a sign was posted that read, "Save the Swamp Monster."

Whether or not the tall grasses of Van Etten marsh shelter a swamp monster is subject to debate, but for the people of the town their marsh is a special place.

Recent visitors to the marsh, however, have observed an unidentifiable footprint, larger than a man's. . . .

Ms. Rusinski is visual information specialist,
SCS, Syracuse, N.Y.

Reclaiming Kaolin Mines in Georgia



by Byron Sanders

Georgia is seldom considered to be an important mineral-producing State. However, it is the Nation's largest producer of kaolin—a fine white clay used for coating high-grade printing paper and in the manufacture of rubber, linoleum, oilcloth, paint, fertilizers, insecticides, and hundreds of other products.

The word kaolin comes from the Chinese *Kaoling*, a mountain in China that produced the first kaolin sent to Europe. Kaolin is still commonly known as China clay.

"When you rub your finger across a sheet of good grade magazine paper," explained John Barton of Theile Kaolin Company, Sandersville, Ga., "the smooth, white surface is all kaolin. Less than 20 percent of the particles on the sheet are bigger than a wisp of smoke."

Barton said that clay is what makes high-speed printing and color reproduction possible today.

About 90 percent of the kaolin mined in the United States comes from an irregular strip of land running across central Georgia into South Carolina. In 1977, about 5 million tons of Georgia kaolin were produced.

Georgia kaolin mining began on a small scale in 1876. Today, the State has 36 kaolin companies and 123 mines.

The Georgia Surface Mined Land Reclamation Program for the rehabilitation of lands affected by mining was initiated on a statewide basis on January 1, 1969. From that date to June 30, 1977, the kaolin surface mining industry mined 9,389 acres of land. Of that amount, 14 percent—or 1,317 acres—has been satisfactorily reclaimed. Of the remainder, thousands of acres have been graded and are awaiting the es-

tablishment of permanent vegetative cover or touchup work before being classified as satisfactorily reclaimed. Many of these previously mined areas are now in pastureland and woodland.

In the strip mining process, draglines or scrapers are used to remove the overburden of soil, which varies from 5 to 80 feet deep. The overburden is placed in sites not covering clay beds, or in areas from which clay has previously been mined. This process leaves a final pit to be established into a lake or pond.

The Soil Conservation Service plant materials center in Americus, Ga., made trial plots with different plants to determine the best critical area treatment to stabilize the kaolin mine spoils.

On steeper areas, diversions and terraces with pipe outlets are used to control erosion. The pipe outlets have become an important tool in terracing to direct the water to a lake or protected area below.

Most of the land to be reclaimed is leveled after mining, subsoiled on the contour, smoothed, and planted with rye in the fall. Permanent vegetative cover is planted into the rye in the spring. This method is similar to the conservation tillage or "no-till planting" of row crops into small grain.

A high rate of fertilizer and lime is usually applied when planting the rye—which will grow up to 6-feet tall in a normal year. The rye is then run over with a cultipacker in the spring and seeded to a combination of lovegrass, common bermudagrass, and sericea lespedeza.

Some areas of reclaimed land are being planted to pine trees for timber production after the sericea lespedeza is established. However, the pines will not grow on the infertile subsoil or pre-

vent erosion without an established permanent sod.

The ponds left on the reclaimed area are being stocked with fish and provide excellent habitat for duck and other waterfowl. Where the reclaimed land has been converted into pastureland, the lakes are used for livestock water.

In Washington County, Ga., the 400-acre Hodges Mine has been reclaimed using sericea lespedeza. It has nine lakes. Bill Phillips of Theile Kaolin Company said, "This tract looks so good after reclamation that it is being considered for use as a golf course."

The American Industrial Clay Company—also in Washington County—is using a reclaimed mine as a recreation area for its employees. A 15-acre lake has been stocked with bass and bream, a beach area developed for swimming, and another 5-acre lake stocked with catfish. Tennis courts, a recreation building, and a picnic area have also been built.

The kaolin industry, with technical assistance from SCS, has been a leader in mine reclamation in Georgia and is proud of the productive land that has resulted from its reclamation work.

Mr. Sanders is district conservationist, SCS, Sandersville, Ga.

SCS Helps Build Strong Bodies 13 Ways

by Arthur Cross

It all began in the summer of 1975. Ruth Henderson, wife of well-known pianist and conductor Skitch Henderson, was visiting her father in Welzheim, Germany. While in Germany, she used a "Trim-Yourself Path," a combination running and walking trail which consisted of 15 exercise stations.

The stations—which included chinning bars, parallel bars, balance logs, tarzan rope swing, and horizontal hang ladders—were spaced about 100 yards apart. The entire length of the course, including warmup and cool-down runs, was 1.4 miles.

Henderson was so impressed with the idea that she thought it would be great to have a trim-yourself path in her hometown of New Milford, Conn. She visited the mayor of Welzheim and obtained a copy of the trail's designs and specifications.

Henderson then presented the plan to the Town Park and Recreation Commission, of which she is a member, and

to other town officials, who received the idea with enthusiasm. Baldwin Park, a 14-acre undeveloped parcel of town land, was selected as the ideal site. The park's partly open, partly wooded features met the different requirements of the exercise stations, and its proximity to a public school would help to promote its use.

In fall of 1975, Henderson contacted the Litchfield County Soil and Water Conservation District which approved her request for technical assistance from the Soil Conservation Service.

SCS designed the trail and exercise stations to be compatible with the soils, topography, and existing vegetation. After examining the site, SCS staff planned the path and stations in such a way that no living trees were cut down, erosion hazards were minimized, and wet soil areas were avoided. Through careful planning, they were able to preserve a mature stand of hemlock trees. The soil around the hemlocks' surface

roots might otherwise have been compacted by the weight of people running on or near it.

SCS matched 13 exercise stations to the park's diverse land features. For example, a slalom section zigzags through a cluster of trees growing on gently sloping, well-drained soil. The hang ladder station is located in a long, level, and narrow opening in the woods. And one can swing on a rope from bank to bank of a brook at the outlet of a small wetland where the soils are well drained and firm.

Construction started in the summer of 1977, under the supervision of Joe Fedin, the New Milford park and recreation director. A Comprehensive Employment and Training Act (CETA) crew of four used mostly noncost materials such as discarded telephone poles and odd pieces of pipe. At each station, they posted signs with diagrams and instructions carved into pine. The path was completed in November 1977.

Ruth Henderson's trim-yourself path has achieved countywide popularity and has sparked nationwide interest. She has received many compliments from its users and calls from people out-of-State requesting information on the path. In addition to the students from the neighboring public school, students from other New Milford schools are taking advantage of the exercise area as well.

Henderson said, "The idea is working very well. A lot of families use the path. You might say, it's a way to bridge the generation gap."

Mr. Cross is district conservationist, SCS, Litchfield, Conn.



Ruth Henderson (foreground) and Nancy Chadwick, Litchfield County Soil and Water Conservation District manager, try out the obstacle section of the Trim-Yourself Path.

Keeping Hot Spots Cool

by Roger B. Wiedeburg

Energy conservation is promoted by many gas and oil companies, but one energy company—TENNCO (Tennessee Gas Pipeline)—practices resource conservation, too.

Paul Ramsey, TENNCO right-of-way agent, said, "We have a responsibility to the landowner, the land, wildlife, and the other parts that make up the environment along our pipeline rights-of-way."

This attitude and an appreciation for the environment caused TENNCO to develop a resource conservation plan in eastern Kentucky several years ago. The plan involved hotspot areas within pipeline rights-of-way.

"Our first consideration in developing the plan was to control erosion and prevent the pollution of local streams," Ramsey said. "The means for accomplishing this would be to establish a herbaceous cover for the pipeline's right-of-way that would furnish pasture or hay, thus creating a compatible situation for the underground pipe, the environment, and the landowner."

Ramsey secured permission from one of the landowners along the pipeline near Clay City, Ky., to use 5 acres of land for test plots. The area was divided into six equal parts on which different species of grasses and legumes were planted.

"What makes this area so unusual is that it is predominantly Colyer, an extremely dry and infertile shaly loam soil," said Donald S. Henry, Soil Conservation Service plant materials specialist for Kentucky. "This is an extremely acid, black shale soil that developed from the New Albany Shale formation." The soil is so acid in this area that TENNCO has to keep constant watch for pipe deterioration.

Shaly loam soil is naturally droughty. Abnormally high temperatures aggravate the problem.

Temperatures are greatest (130° F or 54.5° C) near the Westbend Pumping Plant, located 1.3 miles from the test plots. "Close to the Westbend plant a lot of heat is still in the gas, causing the soil to have a proportionately high temperature," Ramsey said.

The plants for the six test plots were secured through the SCS plant materials centers in Kentucky, New York, and New Jersey. Plant materials specialists Donald Henry and Wayne Everett assisted in selecting the plants.

According to Henry, 'Kentucky 31' tall fescue and 'Interstate' sericea lespedeza, which were planted on one of the plots, are being used as a standard for comparison with the other plots. The others contain 'Appalow' prostrate sericea lespedeza and caucasian bluestem; Interstate sericea lespedeza and caucasian bluestem; 'Tioga' deertongue and weeping lovegrass; 'Lathco' flatpea and Kentucky 31 tall fescue; and Kentucky 31 tall fescue seeded alone.

The plots were prepared and the plants seeded April 11, 1977. "After two growing seasons," Henry pointed out, "Appalow sericea lespedeza, Lathco flatpea, and caucasian bluestem are equal to or better than the standard Kentucky 31 fescue and Interstate sericea lespedeza."

TENNCO furnished all the grass and legume seeds that could be purchased locally. The firm also contributed lime, fertilizer, mulch, and all the labor to complete the resource conservation plan. Glen Gilkinson, TENNCO maintenance foreman, assigned Arlis Martin and Lester Roundtree to the project.

Martin prepared the seedbed in the

fall by disking in 6 tons of lime per acre. The next spring, 6 more tons of lime per acre and 800 pounds of fertilizer were disked into the soil.

Martin and Roundtree then planted the grass and legume seeds and covered them with a light disking. After planting, the area was mulched with 1½ tons of straw per acre, which was held in place with an asphalt base emulsion.

After planting the test plots, the weather turned dry and hot. Coupled with heat generated by super-heated gas in the pipeline, this caused an extreme drought. The mulch shaded, cooled, and prevented excessive moisture losses, helping the grasses and legumes to survive.

With the resource conservation plan, TENNCO not only protected and improved the environment but also realized a side benefit. Before the grass-legume cover was planted, an electronic technician had to carry water to moisten the probe used to check corrosive conditions of the pipes. Now there is enough moisture in the ground naturally to give an electronic reading, even under the very driest weather conditions.

TENNCO and SCS were in agreement from the very beginning about the resource conservation plan.

Ramsey said, "These plantings have more than met my expectations for this area. I knew that if anyone knew how to correct these conditions, it would be SCS."

Mr. Wiedeburg was district conservationist, SCS, Stanton, Ky.

Air Seeding on the Ground

by Jim Hardy

Several of Jim Stock's neighbors nearly ran off the road when they drove by and saw how he was planting small grain on the Mahnomen County, Minn., farm that he runs with his brothers Bob and Jack and brother-in-law Alan Dewey. Not only was he planting right through the trashy stubble of the previous year's crop, but he was also using a planter that blew the seed into the ground rather than pressing it in like conventional planters.

Despite widespread predictions to the contrary, the Stocks' wheat and barley crop came up. Their yields were above the county averages—which were 32 bushels per acre for wheat and 45 bushels per acre for barley—and their crops were as good as any others in the area.

That was 2 years ago. Some of the neighbors are still a little skeptical, but the Stock brothers are convinced now that the air seeder is the only way to go—not only for erosion control, which was their primary reason for going to this conservation tillage system, but also for controlling weeds, saving time and maintenance, and conserving fuel. They figure they've cut their fuel consumption by 25 percent.

They are so satisfied with the system that they are using the air seeder for planting all of their wheat and barley and, in 1979, they planted 90 acres of sunflowers that way as well.

The seeder, designed by a farmer in Canada, has only been on the farm equipment market for about 3 years. It is used more in Canada than in the United States, although farmers in Montana, North Dakota, and northwestern Minnesota are beginning to use it.

The Stocks saw the air seeder displayed at a farm show and decided to try it. "The main reason we bought it was to start a minimum tillage operation in grain," Jim Stock said.

The air seeder attaches to a field cultivator and blows the seed through hoses into the ground. A harrow attaches to the field cultivator to level the seedbed. The Stocks also apply liquid fertilizer in the same operation.

The Stocks originally had a 60-bushel unit and have since replaced it with a 120-bushel unit on a 38-foot cultivator to speed up the seeding operation.

Before the Stocks bought their air seeder and started their conservation tillage system, they operated like many farmers in their area—plowing with a

moldboard plow in the fall, cultivating once in the fall, cultivating once or twice in the spring, dragging the field, seeding, and dragging once more for good measure.

"We have eliminated plowing, two cultivations, and a harrow operation," Jim said. "This has greatly speeded up our seeding time and reduced fuel consumption, along with leaving more crop residue on the soil surface after planting. We have also found that the air seeder requires less maintenance than the press drill.

"Some of the neighbors are a bit skeptical of our seedbed preparation," Jim said, "because we aren't disking, cultivating, and dragging our fields before planting."

He believes their seedbed preparation is adequate, though. "The proof is in the bin," Jim continued. "Our crop yields with the air seeder have shown that all those previous operations are not necessary for a good seedbed."

It's too early to say the Stocks have started a new fad with their air seeding, but one of their neighbors, Sylvester Spaeth, now has an air seeder too.

"I bought the air seeder after seeing the Stocks operate theirs," Spaeth said. "I thought it was much better than a press drill because it saved time with fewer trips over the field to get the field ready for planting. I don't have a serious erosion problem, but what I do have will be reduced."

According to Spaeth, the air seeder has the potential of becoming the seeder of the future.

Jim Stock (left) and Jim Hardy, SCS district conservationist, discuss seedbed preparation using the air seeder which attaches to Stock's cultivator



Mr. Hardy is district conservationist, SCS, Mahnomen, Minn.

Rye From the Sky

by Dick Lehnert

Farmers in Michigan's Leelanau County—normally conservation minded because of their hilly, wind-blown, sandy soils—are trying a new tool they hope will make their land less erosive and more productive at the same time.

The "hot" new tool is aerial seeding of rye cover crops, mostly into standing corn. The aerial rye seeding program is largely the brainchild of Soil Conservation Service District Conservationist Bernie Huetter. Huetter, like a modern-day Moses, has a real knack for calling manna down from heaven. His manna is "rye from the sky," food for the soil.

"Basically," said Huetter, "we're looking for three benefits: winter cover on corn land to control erosion, especially that chopped for corn silage; ground cover during harvest operations to provide good footing for equipment; and weed suppression next year. Rye competes very well against weeds."

Also important is organic matter. Leelanau County's soils, while variable, tend to be sandy, even gravelly. They're low in organic matter and like sieves when it comes to holding water. While the soil is light and often droughty, it's a resource that needs protection.

Years ago, Leelanau farmers were won over to contour stripcropping. The strips and small fields don't make aerial seeding of rye nearly as easy as where fields are bigger. Huetter doesn't expect the new practice to replace stripcropping, which is deeply ingrained in the county. But, he says, "There's a lot of land in the county that is not well managed with strips or any other conservation practice."

Huetter wanted me to see aerial rye seeding firsthand. While we waited for the airplane, we visited farmers in the area.

Jerry Kelenske of Cedar, a typical Leelanau Soil Conservation District co-operator, has been farming on his own 3 years. "When I bought the farm, it was from an estate and was just in grass," Kelenske said. "It had been in strips, but I decided to try for bigger fields."

He quickly found the land just too sandy and rolling. But rather than go back to strips, he decided to try new techniques. Last year he put in his first 30 acres of rye in standing corn.

From the Kelenske farm, Huetter and I dashed north to Julius Kolarik's farm in Northport. Kolarik, Leelanau Soil Conservation District chairperson, was getting wheat together to seed, instead of rye. Huetter explained that the livestock farmers try to use what they have rather than buy seed, so farmers with wheat use wheat.

We finally met up with the pilot, Ed Knapp. The plane was at the airport waiting for parts for the aerial rye seeder.

Knapp's company makes its way by spraying fungicides, insecticides, and vine killers on upper Michigan's potato fields. Knapp considered rye seeding a "piece of cake" compared to Upper Peninsula flying where he flies at 130 knots 15 inches above potato fields. "We often come back with vines on the wheels," he said. "Fifty feet up for rye is a more reasonable altitude."

The plane held 1,500 pounds of clean rye, enough for about 13 acres at 2 bushels per acre. Rye is emitted through a gate box into a spreader that drops a neat 50-foot swath. Special marker flags are dropped by the plane so no ground workers or prior flag arrangements are needed.

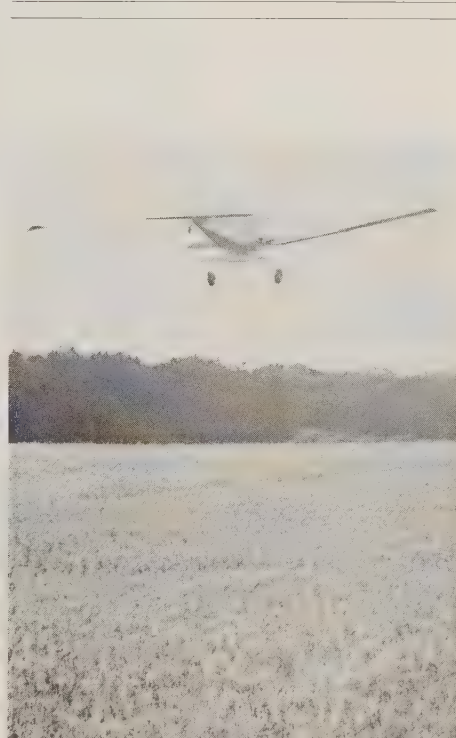
The parts for the plane finally arrived

and when the wind dropped about 5:30 p.m., Ed Knapp hit the air, the plane loaded with the rye. As the sun was setting, pilot Ed Knapp made the final pass over farmer Elmer Kalchik's 70 acres of corn. Waiting atop his dairy barn, I looked down and out across Kalchik's corn and his cherry orchards to Lake Michigan in the distance.

Then the plane came. Closer, closer, until snap went the shutter and I had a photo. Is it scary watching a plane come right at you? You bet! Through a telephoto lens, the urge is to duck. But knowing there were three tall silos behind me was reassuring. I knew he would have to pull up or risk making an even more dramatic picture for the local newspaper.

Mr. Lehnert is editor, *Michigan Farmer*, Lansing, Mich.

Adapted from an article in the October 7, 1978, issue of *Michigan Farmer*.



Back to the Hills

by Gene Warren

There was a time when hill farming in Louisiana was as common as sand at the beach. In the 1930's through the 1950's, almost any hillside had a cotton and corn patch on it. But in the sixties and seventies, most hill farms were planted to bahiagrass, coastal bermudagrass, and loblolly pine trees.

Lately, increasing interest in soybeans has renewed farmers' interest in planting the hill land in row crops. One reason is that choice bottomland is hard to find, and high profits from beans lure many farmers to land that is open and able to be plowed.

The Soil Conservation Service estimates that more than 75,000 acres of Louisiana hill land is now in soybeans. Slope on the hill land ranges from 2 to 4 percent, and erosion is a real problem when the land is taken out of grass.

Elbie Crooks and his son, Clyde, have gone from crops to cows and back to crops on their 40-acre farm in

LaSalle Parish. But they are using a trick or two to control erosion on their sloping, 20-acre bean field.

"I bought this place back in the early 1950's," said Crooks. "The Soil Conservation Service had helped the original owner build terraces on the sloping land, so I farmed the fields for years without any erosion problems." Crooks quit row farming in the sixties, seeded the land to bahiagrass, and bought a small herd of cows. But one thing he didn't do was plow down his terraces like many other hill farmers did who had also switched from crops to grass.

"Last year I decided to sell my cows and let my son, Clyde, try his hand at growing beans," Crooks said. "All we had to do was to work up the old terraces, and they were as good as new." Clyde teaches math at Jena High School and farms the bean crop in his spare time. "Sure, it's a little harder to work the field when you have to follow

the terraces around the slope," he said. "I even wound up with a few short rows because they are all on the contour with the terraces. But the way I figure it, without the terraces, most of Dad's soil would be down in his pond."

Crooks uses a two-row tractor to farm the land and is quick to point out that it wouldn't be as easy to farm the terraced land with larger equipment.

Kenneth Graham, district conservationist for SCS at Jena, said that other farmers converting sloping grassland to beans should follow Elbie and Clyde Crooks' good example. "SCS can help farmers check the old terrace systems and even design new systems if the old ones are gone," said Graham.

The Crooks use other conservation practices besides the terraces. All their land that is not in beans, sweet potatoes, or field peas is in bahiagrass. Crooks said that he left the land in grass to protect the fine sandy loam soil from erosion.

Each year he cuts the grass and sells it as hay. Most of the potatoes and peas he harvests are sold at the house. "People learn that I have stuff to sell and come by to buy it as fast as I can pick it," said Crooks.

It is not uncommon to lose 10 to 20 tons of soil per acre from erosion each year if sloping fields are not protected by terraces or other conservation measures. Elbie and Clyde Crooks have learned that with a little planning many Louisiana hill farmers can revive their old terrace systems and put them back to work, saving the soil.

Mr. Warren is public information officer, SCS, Alexandria, La.



Clyde Crooks inspects his old terrace system used to control erosion on a soybean field.

North Carolina Soils Selected for Global Museum

by Darwin L. Newton
and Frank Jeter, Jr.

Two agricultural soils from North Carolina—Cecil sandy loam and Norfolk loamy sand—have been selected as representative American soils for the International Soils Museum in The Netherlands.

North Carolina is the only Southern State sending soil profiles to the museum, which is collecting benchmark soils from every continent. So far, some 350 soil monoliths from 30 different nations have been accumulated.

In the initial sampling, the United States will provide 15 soils from 10 States besides North Carolina. Other States contributing soils are Indiana, Illinois, Iowa, Nebraska, North Dakota, South Dakota, Minnesota, Arizona, Colorado, and Wyoming.

The Cecil sandy loam being flown to the museum comes from Catawba County. The Norfolk loamy sand is from Robeson County.

The International Soils Museum, which opened in the spring of 1979, was first conceived by the International Soil Science Society. It was built at Wageningen, The Netherlands, with financial assistance from the United Nations Educational, Scientific, and Cultural Organization and the Dutch Government.

Monoliths of each soil will be on public display at the museum. Each monolith is encased in a special wooden container, approximately 1 foot wide and 5 feet long, with a profile that shows how the soil would look in its natural locale, from ground surface to a depth of 5 feet.

In addition, 5-pound samples of each horizon of these soils will be sent to the museum for physical and chemical analysis. These data will be available to scientists and others visiting the International Soils Museum.

Cecil sandy loam is the predominant agricultural soil in the Piedmont area of North Carolina. It is well suited to producing all types of row crops. Forests also grow well in this soil. Cecil is classified as a clayey, kaolinitic, thermic Typic Hapludult.

Norfolk loamy sand is a prevalent soil in the Coastal Plains of North Carolina. It is an excellent agricultural soil, used mainly to grow tobacco, corn, soybeans, and vegetable crops. Norfolk is classified as a fine loamy, siliceous, thermic Typic Paleudult.

"Since the museum has exacting standards for the soils that will be in-

cluded in this global endeavor, we're very pleased that North Carolina was picked to provide two kinds of soil," said Jesse Hicks, Soil Conservation Service State Conservationist in North Carolina.

The museum is expected to attract soil scientists and related specialists from all parts of the world.

Mr. Newton is assistant State soil scientist, SCS, Raleigh, N.C.
Mr. Jeter is public information officer, SCS, Raleigh, N.C.



With its soil strata looking exactly as they would in their natural location, this sample of Norfolk loamy sand is packed in a wooden container for shipment to the International Soils Museum. Soil Scientist Darwin Newton prepares to load the profile into a station wagon.

New Publications

Sources of Native Seeds and Plants

by the Soil Conservation Society of America (SCSA)

This publication lists hard-to-find sources of native seed and plant materials and companies and organizations that have native seeds and plants available for sale, retail and wholesale.

Native plants have often been overlooked and exotic species have been introduced to areas where they were not adapted and where they did little to maintain the land's productivity. Now the benefits of native plant materials are more completely understood. Recently there has been an increase in the use of native plants that require little or no maintenance and provide pleasing esthetic properties.

However, sources of these native materials have been scarce. Recognizing this, SCSA over the years has maintained a listing of these sources. This latest, updated version includes some 167 sources of native materials, including wildflower seeds, native grass seed, native tree and shrub seed, and native tree and shrub plant stock. The listing does not constitute an endorsement of the firms by SCSA but merely is a list of firms dealing in these hard-to-find native seeds and plants.

Single copies of the 20-page publication are available for \$2; 10 or more copies are \$1.50 each. Orders should be directed to the Soil Conservation Society of America, 7515 N.E. Ankeny Road, Ankeny, Iowa 50021.

Proceedings of the First International Rangeland Congress

by the Society for Range Management

The first of its kind, the International Rangeland Congress was sponsored by the Society for Range Management in August 1978 in Denver. Its purpose was to help range managers gain a better understanding of worldwide rangelands, and to give rangeland users the benefit of the range profession's combined international expertise.

The proceedings is a collection of more than 200 invited and volunteer papers by authors from more than 39 countries. The papers address the following subjects: (1) Social, political, and economic systems that enhance application of rangeland management and development practices; (2) multiple benefits from rangeland, including grazing animals, food and fiber for humans, recreation and tourist income, and vegetation for cover for critical wetlands; and (3) descriptions and classifications of worldwide rangeland ecosystems.

The proceedings also contains author and general indexes, original illustrations, photographs, charts and graphs, and bibliographical material.

With 724 pages bound in hard cover, this volume makes an invaluable reference for a private or institutional library. Copies are available for \$60 from the Society for Range Management, 2760 West Fifth Avenue, Denver, Colo. 80204.

Help Yourself

by the U.S. Army Corps of Engineers North Central Division

This pamphlet provides property owners with an information guide for protecting the Great Lakes shoreline from damage due to erosion. The U.S. Army Corps of Engineers compiled and revised these data in cooperation with the Great Lakes States.

The pamphlet progresses from understanding shore erosion, to planning considerations for erosion control, to selecting a type of shore protection. Its 24 pages are illustrated with photos, maps, charts, and diagrams.

Several shore protection designs and costs are presented, with discussion of construction and maintenance guidelines, standard designs, and sample specifications. The pamphlet also includes information on how to initiate and organize community action on shore protection measures, a section accompanied by photographs on demonstration research projects, and a glossary of terms.

The installation of shore protection measures usually requires the services of a consultant to develop the final design necessary for a Corps permit.

Copies are available from the North Central Division, U.S. Army Corps of Engineers, 536 S. Clark Street, Chicago, Ill. 60605. Copies were distributed to Soil Conservation Service State offices on August 20, 1979, under National Engineering Bulletin No. 40-9-44.

News Briefs

More on Wind-Powered Irrigation Pumps

A news brief in the October 1979 issue of *Soil Conservation* discussed the U.S. Department of Agriculture's (USDA) research on using wind as an alternative source of energy for pumping irrigation wells. USDA's Science and Education Administration (SEA) has found another use for wind in irrigation pumping.

The Great Plains covers almost half of the irrigated lands in the United States. About 15 percent of the irrigation water for the Great Plains is being pumped from surface sources. SEA Researcher Lawrence Hagen and Kansas State University Research Assistant Muhammed Sharif have developed a way to use the wind to pump water from the surface sources.

Hagen and Sharif have devised a system of low-lift irrigation pumping for reusing the irrigation water which "runs off" the fields and collects in tailwater pits.

They have designed and tested a Darrieus vertical-axis wind turbine which is mechanically coupled to a vertical turbine pump. The wind turbine is eggbeater shaped with two aluminum airfoil blades. It is 20 feet in diameter, 30 feet tall, and is mounted on an 8¹/₄-foot tower.

The wind-powered turbine pumps the unused irrigation water into a small reservoir at the head of the field. The reservoir then supplies the water to a gated pipe irrigation system. This irrigation pumping system is especially adaptable to those areas where electricity or natural gas commonly used for pumping irrigation water is not available.

USDA's research findings on wind-powered irrigation pumping are a promising source of relief to Great Plains irrigation farmers.

Meetings:

January

3-8	American Association for the Advancement of Science, San Francisco, Calif.
6-10	American Farm Bureau Federation, Phoenix, Ariz.
7-11	North American Game Breeders and Shooting Preserve Association, Orlando, Fla.
13-14	Land and Water Conservation Exposition, Des Moines, Iowa
17-21	National Wool Growers Association, San Diego, Calif.
21-25	National Cattlemen's Association, San Diego, Calif.

February

10-14	National Association of Conservation Districts Convention, Houston, Tex.
11-15	Society for Range Management, San Diego, Calif.
15-18	American Association of School Administrators, Anaheim, Calif.
20-23	Land Improvement Contractors of America, Phoenix, Ariz.
23-27	The Irrigation Association Technical Conference, Houston, Tex.

March

9-14	The American Society of Photogrammetry, St. Louis, Mo.
16-18	American Pulpwood Association, New Orleans, La.

Small Farm Assistance Program

The U.S. Department of Agriculture (USDA), the Community Services Administration (CSA), and ACTION—the parent body of VISTA and the Peace Corps—are coordinating their resources to help small farm operators improve their quality of life through pilot small farm assistance projects.

Seventeen projects have been selected to demonstrate the coordinated efforts of USDA, CSA, and ACTION in solving the problems of small farm operators and their families. Farmers in the project areas will receive increased technical and financial assistance in solving their conservation problems and in making the most of opportunities to improve their farm management and marketing skills and improve their standard of living.

Projects include increasing family income on small farms in Winston County, Miss., and improving farm family skills for both farm and nonfarm em-

ployment; increasing the family income on 50 small farms in Charles Mix County, S. Dak., through an intensive farm family resource management program; and helping 500 farmers in the Upper Pocatalico watershed in West Virginia control erosion and pollution problems that are lowering farm productivity.

The USDA agencies involved in the projects are the Science and Education Administration-Extension Service; Farmers Home Administration; Forest Service; Soil Conservation Service; Agricultural Stabilization and Conservation Service; and the Economics, Statistics, and Cooperatives Service.

Small farm assistance projects have been approved in Alabama, Colorado, Georgia, Hawaii, Kentucky, Louisiana, Maine, Mississippi, Missouri, Nebraska, Nevada, New Mexico, Oklahoma, Oregon, Rhode Island, South Dakota, and West Virginia.

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Well-Qualified Beginners in Conservation

From the Administrator

A little over 2 years ago, with no fanfare, the Soil Conservation Service assumed an important, nationwide responsibility to rate and certify professional conservationists at entry grade levels.

SCS took over this task at the request of the Office of Personnel Management (OPM) in September 1977, due to a growing awareness that SCS possessed the requisite expertise to carry out this national responsibility and was in the best position to determine the qualifications of potential employees.

The Special Examining Unit (SEU) set up in the National Office to carry out this duty has since racked up a steady, enviable record of accomplishments. The largest unit of its kind outside OPM, it has become a model for other agencies.

New procedures and additional rating criteria were established for soil conservationists, soil scientists, and range conservationists at the entry grade levels. The added criteria reflect the knowledge, skills, and ability required for these positions and place emphasis on the broadest academic background in plant, soil, water, and animal sciences.

The SEU has trained as raters approximately 200 conservation professionals located throughout the Nation.

Some 9,200 well-qualified individuals had been referred to employing officials in SCS and the Forest Service and in the Bureau of Land Management, U.S. Department of the Interior—the major users of the service—by the end of fiscal year 1979; and a total of 1,549 individuals had been selected for positions.

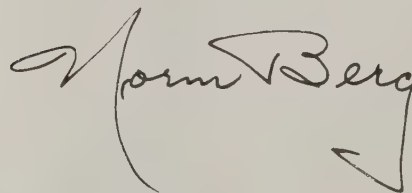
Registers are computerized, making them more quickly accessible.

Selecting officials are notified when registers get low, so that they can accelerate recruiting activities.

Conservation districts benefit when SCS and other agencies can meet staffing needs better and faster. Districts also can benefit more directly, by requesting referral lists of eligible applicants to meet their own staffing needs.

The young people who are eager to begin a conservation career obviously benefit from the streamlined system, too.

We look forward to even greater accomplishments and assistance from the SEU as it continues its third year of operations. We fully expect it to make significant contributions to coping with the many, diverse conservation challenges that SCS and districts together face in the "Action Eighties."

A handwritten signature in cursive script that reads "Norm Berg". The signature is written in dark ink and is located at the bottom of the page, below the main body of text.

Soil Conservation is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil Conservation* has been approved by the Director of the Office of Management and Budget (through January 31, 1980). *Soil Conservation* (ISSN-0038-0725) is published 12 times a year. Controlled circulation postage paid at Washington, D.C.

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Cover:

While watching the 1980 Winter Olympics in Lake Placid, N.Y., this month, few people will think of the conservation measures that were needed on the snow-covered hills. (See article beginning on page 4. Front cover photo courtesy of the Lake Placid Olympic Organizing Committee.)

Erosion Control for the Olympics

Protecting the Soil in a Harsh Environment

At the base of the 1980 Winter Olympics—to be held in Lake Placid, N.Y., this month—is over 700 million years of geologic history. The ancient Adirondack Mountains in which this small, resort community is nestled have weathered glaciers, blizzards, subzero temperatures, and the varied activities of man, including the 1932 Winter Olympic Games, also held in Lake Placid.

The climate of the mountains is harsh—harsh on life and on the elements that support life. One of these elements is the soil: a vital yet easily destroyed resource in the Adirondacks. It has taken 10,000 years, since the last glacier swept the mountains bare, to build a 6-inch layer of topsoil. One pass of a bulldozer can wipe out 10,000 years of nature's work in seconds.

In preventing environmental hazards posed by preparations for the 1980 Olympic Games, the Soil Conservation Service has played an important role. The combination of the soil limitations, the harsh climate, and earth moving to meet the exacting demands of Olympic facilities created erosion and stabilization problems that called for SCS' expertise.

The agency first became involved in 1975, when SCS District Conservationist Donald Wild began attending meetings of the Environmental Advisory Task Force. The meetings were open to the public and the press, and included reports by the general contractor for Olympic construction and the New York State Departments of Health and Transportation, among others. As a result of these meetings, Wild was invited to serve as SCS represen-

tative on the Federal-State Joint Agency Committee, a group comprised of the various agencies involved in the planning and construction of facilities for the Olympic Games. The committee met every 2 weeks, and advised on many phases of Olympic planning and construction: everything from progress on the new fieldhouse to dealing with trash disposal during the games.

Providing Soil Information and Planning Parking Facilities

Wild's work on the committee and the resulting contacts led to requests for SCS assistance and advice. One of the first requests was for a soil survey. Soil information was particularly vital in planning for the Olympics not only because of the harsh Adirondack climate, but also because the soils in the area could

be easily destroyed if proper safeguards were not taken on construction sites. The tight construction schedule and uncertain Adirondack weather added urgency to the planning effort.

At the request of the Lake Placid Olympic Organizing Committee (LPOOC), a six-person SCS soil survey party began work in 1975 to map 45,000 acres. The survey party completed the mapping and presented the soil survey to the LPOOC in 1978.

The information in the soil survey was especially useful in planning parking facilities for the tens of thousands of vehicles that will be used by athletes, spectators, workers, and vendors for the games. During the games, no private vehicles, except residents', will be permitted in Lake Placid. Visitor parking will be provided in 10 peripheral parking



The harsh climate, soil limitations, and earth moving for the Olympic facilities combined to create erosion problems as shown on the hill for the 70- and 90-meter ski jumps. SCS recommended several measures such as conservation plantings and tile drainage to control the erosion.

lots located in towns close to Lake Placid. Buses will transport visitors to and within the village. The challenge was to prevent the entire area surrounding Lake Placid from becoming one giant parking lot.

Each lot will be "reclaimed" after the games, or returned to its pre-Olympic use—in one case, a high school athletic field; in another, a private campground. Based on soil information, Don Wild provided the LPOOC with recommendations on laying a durable surface for the parking lots, yet one that could be quickly reclaimed afterwards. Recommendations included the amounts and depths of topsoil needed on top of the gravel, sawdust, and wood chips used in each lot, and grass seedings that will quickly establish themselves after the games.

Stopping the Sliding Olympic Village Site

The soils presented another challenge during construction of the Olympic Village, which will house about 2,600 athletes during the competition. The village site is bordered on two sides by steep hills and on a third by Ray Brook, a trout stream. After the site was cleared for construction in 1977, a combination of equipment traffic, an unusually wet fall, and soil limitations overloaded the contractor's erosion and sediment control measures. These included debris basins—which allowed sediment from runoff to settle before the runoff entered the stream—filter paper over the basin outlets, and hay bale diversions.

Time was the problem in controlling the erosion. It was already October, and the site had to be stabilized before

winter—which can come early in the Adirondacks. The erosion problems were worsening rapidly, with increasing amounts of sediment from the bordering hillsides and the cleared site itself ending up in Ray Brook. "The whole thing just started moving," recalls Jim Hill, a former SCS engineer now with the Adirondack Park Agency as a soil and water specialist.

When Hill called Wild, 2 inches of sediment had already been deposited in Ray Brook. Wild contacted SCS Area Engineer Dana Chapman in Albany and SCS Conservation Agronomist Bob Crawford in the SCS State office in Syracuse. They evaluated the problems and made recommendations immediately so the problems could be corrected in a matter of days.

The contractor accepted the recommendations and immediately modified the debris basins to provide for a longer retention time to allow sediment to settle out before the water was outletted into the stream. Coarser filter paper was installed on the basin outlets and 3 to 4 inches of wood chips were laid down on critically eroding areas.

The hillside location of the Olympic Village called for more permanent erosion control measures as well. SCS recommended the installation of vegetative bench terraces on one slope to catch runoff. Rock gutters and diversions were installed on the other sides to safely divert water around the site. Conservation seedings of redbud, perennial ryegrass, tall fescue, birdsfoot trefoil, and medium red clover were planted on slopes and stabilized with jute netting.

According to Don Wild, these measures have worked. The plantings are now well established and Ray Brook



When erosion and sediment control measures became overloaded during construction of the Olympic Village, more than 2 inches of sediment was deposited in Ray Brook, a trout stream. SCS was called in to evaluate the problems and recommend solutions.



To help control erosion, SCS recommended that vegetative bench terraces (top photo) be installed on a hillside sloping into the athletes' housing site. Rock gutters and diversions (bottom photo) were installed to divert water safely around the site.

once again runs clear, although some sediment is still visible on the streambed.

Keeping the Jumps Up

One of SCS' most important areas of involvement was with the 70- and 90-meter ski jumps. The 90-meter jump towers 266 feet above the top of a hill just south of Lake Placid. The 70-meter jump is a few feet beside and below it on the same hill. During the games, skiers will hurtle down from the tops of these structures and attempt to land as far as possible down the hill. From the bottom of the hill to the top of the 90-meter jump is 466 feet—almost one and two-thirds the length of a football field.

The slope of the hill had to be built to a precise and constant angle of 38° because slope determines a skier's distance. After construction and grading with machinery, the grade was leveled using hand tools and a string grade line. The slope was then planted to stabilize it.

However, the following spring problems became apparent. The local glacial soil material used in building the hill began to slip from the middle of the slope towards the bottom, destroying the precise 38° slope. The problem was that the soils had to be placed at an angle steeper than their natural angle of repose.

In addition, an access road on the original contour of the hill had been buried during construction. Water draining down the original hill contour was blocked by the old road and forced out onto the fill soil placed to form the new slope. As it ran down the new slope, it began to erode the newly placed soil, worsening an already bad situation.

Again Don Wild was consulted. He suggested replacing part of the sandy, loose soil with topsoil to provide a better base for seedings, and installing a tile drainage system at the middle part of the slope where water was draining out from the old road. He also recommended conservation plantings such as redtop, creeping red fescue, perennial ryegrass, and birdsfoot trefoil for hard-to-stabilize areas of the slope itself. A thicker hay mulch was also applied to hold the plantings in place while they germinated.

The plantings have become well established in the newly laid topsoil, and the drainage system is working. The slope is now ready for the Olympics.

Stabilizing the Fieldhouse and Other Sites

Slope stabilization was also a problem at the site of the new fieldhouse. The arena from the 1932 Olympics was not large enough for the expanded 1980 games, so a new 8,500-seat fieldhouse was constructed beside it on the hillside. After construction was completed, the architects requested SCS' recommendations on how to best stabilize the slope behind the new structure. The area had already been graded and bench terraces installed. Don Wild recommended regrading and seeding with perennial ryegrass, creeping red fescue, tall fescue, redtop, and Kentucky bluegrass. Since the architects wanted some sort of woody plants on the slope for esthetic reasons, Wild also recommended shrubs such as bristly locust, highbush cranberry, silky dogwood, and juniper to be planted after the grasses had become well established.

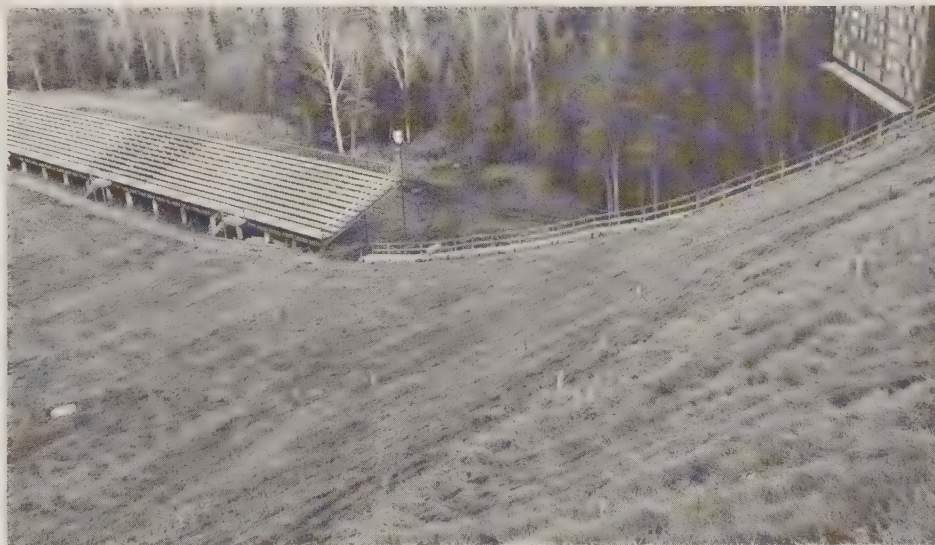
SCS assisted on other Olympic sites. For the new cross-country ski trails on

Mt. Van Hoevenberg south of the village, SCS recommended 'Lathco' flat-pea, which is a durable plant and holds snow cover well. Topsoil depth recommendations were made for the bobsled run, also on Mt. Van Hoevenberg, which was totally reconstructed from the 1932 course. The original wooden run was replaced with refrigerated concrete.

What happens to all of these facilities after the Olympics? Plans are to use them as a permanent winter sports training facility operated by the State of New York. The cross-country ski trails and the bobsled and luge runs on Mt. Van Hoevenberg will be operated as a recreation area open to the public.

Now everything is ready for the show. When the Olympic flame is lighted high over the snow-covered land, few will give any thought to the soil beneath it. Thanks to those agencies charged with protecting the soil and its environment, such as the Soil Conservation Service, they won't have to.

Ms. Rusinski is visual information specialist, SCS, Syracuse, N.Y.



Following SCS recommendations, part of the loose soil was replaced with topsoil on the landing hill for the 70- and 90-meter ski jumps to provide a better base on which to establish conservation plantings. The plantings included redtop, creeping red fescue, perennial ryegrass, and birdsfoot trefoil.

The Johnny Appleseed of Windbreaks

In Holt County, Nebr., windbreak trees have been ripped out by the thousands in order to make room for center pivot irrigation farming. One man, though, has waged his own personal battle for the trees.

During his 72 years in the area, Claude Liermann has planted about 55 acres or more than 56,000 trees. "What this country needs is more trees," said Liermann of the sandy rangeland.

Prior to retiring 4 years ago, Liermann ran an 800-head cow-calf operation on his 3,300 acres. He added, "I've always believed in trees, and began planting them back in 1928 when I first started ranching. I saw how the other ranchers were using windbreaks established by the homesteaders and were keeping their cattle behind the big groves for protection.

"Years ago we used to build sheds to protect the cattle. But today you couldn't have enough sheds to cover the size of some of these herds. The trees are good protection for the cattle, and that protection means extra weight at market time."

The windbreaks have also provided shelter to wildlife. Liermann added, "I was about 20 years old before I ever saw deer running around here. Now with more trees throughout the county, we see deer, pheasants, and quail."

"Claude Liermann has always been conservation minded," said Bob Lowe, district conservationist for the Soil Conservation Service in Holt County. "His file of conservation work is about as thick as a Sears and Roebuck catalog."

In the late sixties, Liermann was cited twice by the Nebraska Centennial Commission. One award was given to him for his tree planting efforts and another

for excellent grassland and rangeland management practices.

Liermann remarked, "A person is always learning. In one of my first windbreaks I had a good Chinese elm grove. Then one year we got an early winter snowstorm and it wiped out the entire center of the grove. I haven't planted any Chinese elm since.

"Another time I planted some boxelder trees in a windbreak near the house. If you look around here," said Liermann glancing around the room, "you might be able to see some boxelder bugs. I just can't seem to keep them

out of the house.

"Since then I've planted cottonwoods, redcedar, and ponderosa, Austrian, and jack pines. But the redcedar is my favorite because it gives the most protection—its branches are thicker and its needles are closer together."

SCS has provided assistance to Liermann in designing the windbreaks, selecting tree species, staking out spacing, and other techniques for insuring the trees' survival.

Liermann explains how he handles the delicate seedlings. "A key to the survival of the seedlings is to take care

When spring arrives, Claude Liermann is quick to get out and check the trees he has planted for windbreaks. He says that it is important, especially during the first 3 years, to plant new seedlings for any trees that have died.



of them when they first arrive at the ranch. You can't leave them in the shipping boxes. To keep the roots from drying out, you should 'shoe-in' or bury the roots until ready for planting.

"When it's time to plant them, we're always careful to carry the seedlings with the roots in a bucket of water. Otherwise, on a hot, windy day, the air hitting the roots can kill them in a very short time.

"We use a plow to throw the soil so that it will provide a barrier against the wind and protect the new seedlings. Using a shovel, we plant the seedlings

as close to the thrown soil as possible."

Liermann added, "After the initial planting, the next 3 years are critical for checking the trees and replanting any that have died. Many people don't, and, as a result, you can see windbreaks with holes where trees have died. These windbreaks would have been more effective if the dead trees had been replaced. If you don't replant early, the surviving trees will have grown too large for the new seedlings to catch up.

"Spring tree planting has always been a regular event on our ranch. We

have planted trees every year since 1949, and always plant at least 200 trees. This year we're planting 3,000. I'm going to take my time planting them though—I'm getting kind of 'antiqued' now, and can't manage those long days anymore.

"But I know that as long as I'm able, I'll continue to plant trees," declared the "Johnny Appleseed" of Holt County.

Mr. McGrane is public information officer, SCS, Lincoln, Nebr.

Cows and calves find protection from the wind behind windbreaks planted by Liermann. The windbreaks also provide shelter to wildlife.

Even a young windbreak can trap snow. As the years go by, this windbreak will supplement the existing windbreaks on the Liermann ranch and provide continued protection.



The Greening of Oklahoma

by F. Dwain Phillips

Oklahomans are showing a new interest in an old conservation practice—windbreaks. Innovations in the design and kind of trees used, introduction of the drip irrigation system, and an intensive information campaign have revived this interest.

During the 1930's and 1940's, more than 2,000 miles of windbreaks were planted in Oklahoma. This was one of the first conservation practices applied to the land to reduce wind erosion. Interest in windbreak plantings declined, however, in the sixties and early seventies for three reasons: (1) Limited rainfall in the western part of the State was killing many of the tree seedlings; (2) the mature trees were robbing crops of precious moisture; and (3) the older windbreaks consisted of 10 to 15 rows of trees, which took valuable land out of production.

In 1977, Leonard Solomon, executive director of the Oklahoma Conservation Commission, working with the Soil Conservation Service, called together a group of State and Federal agencies and public organizations to discuss ways to encourage windbreak plantings.

Agency representatives formed a committee to carry out an information campaign to promote windbreaks. The committee included representatives from the Oklahoma Conservation Commission, the Oklahoma Departments of Wildlife and Agriculture, Oklahoma State University Cooperative Extension Service, Oklahoma Wildlife Federation, and the U.S. Department of Agriculture's Agricultural Stabilization and Conservation Service (ASCS) and SCS.

These agencies conducted the campaign using press releases, feature articles, television programs, and pamphlets and brochures. The cam-

paigned out that windbreaks with 2 or 3 rows of trees are just as effective as the older ones with 10 or 15 rows. It recommended the use of such trees as pine, cedar, arborvitae, and autumn olive which don't sap as much moisture from adjoining cropland as some species that were used in the past. Also, the evergreens provide more year-round protection from the wind.

In the campaign the agencies emphasized the following benefits of planting windbreaks:

- Reducing wind erosion;
- Protecting livestock from the wind;
- Trapping snow;
- Providing cover and food for wildlife; and
- Saving energy when planted around farmsteads by reducing utility bills.

In response to the critical problem of watering the trees, the agencies recommended using drip irrigation systems to establish windbreaks. The trickle or drip irrigation system distributes water through plastic lines. An opening, or emitter, is located at each plant so that water is not wasted in the area between the plants.

Usually drip systems are used for the first few critical years of a windbreak's growth to establish the seedlings. The first drip systems used in Oklahoma windbreaks were installed in 1978 in 18 windbreaks. Survival of these trees was 95 to 99 percent. The average survival rate for tree seedlings not watered by a drip system is 40 to 50 percent.

Landowners in western Oklahoma had tried for years to keep the seedlings alive, but water scarcity, sandy soil, and hot, dry summer winds often made it impossible. They now feel they have the answer with the drip irrigation system.

Conservation districts, SCS field personnel, and State foresters have been providing technical assistance in selecting the location of the windbreaks and the tree species, proposing the amount of spacing between trees, providing soil information, and designing the drip irrigation systems.

Cost-sharing assistance on windbreaks and drip systems is provided through the Great Plains Conservation Program, administered by SCS in 30 western counties of the State, and through the Agricultural Conservation Program, administered by ASCS.

The campaign has already had an effect. In 1978, 275 windbreaks were planted in the State—only 31 had been planted the year before. And in 1979, 508 windbreaks were planted and 136 drip irrigation systems installed.

Oklahoma farmers and ranchers are catching on to a winning combination: improved windbreaks and water-efficient drip irrigation systems.

Mr. Phillips is public information officer, SCS, Stillwater, Okla.



Native Plants Used in Landscaping Watershed Lake

by David G. Thompson

Building a floodwater retarding dam is always a complex effort, but building one on property listed in the National Register of Historic Places further complicates the effort.

Blue Hawk Peak Ranch—commonly known as the Pawnee Bill Museum and Mansion—in Pawnee County, Okla., was the home of Gordon William Lillie, who once traveled with the Buffalo Bill Wild West Show and later formed his own show known as the Pawnee Bill Wild West Show. The mansion, which Lillie and his wife built in 1910, sits atop a hill and overlooks the surrounding countryside, including about 2,000 acres Lillie acquired to raise what was then the largest privately owned buffalo herd. The ranch is located within the Lower Black Bear Creek watershed and the Pawnee County Conservation District.

Because of the mansion's vantage point, any floodwater retarding dam built in the area would be highly visible. Thus, special considerations were required when the planning began for constructing a dam in a valley below the mansion.

A planning team made up primarily of specialists from the Soil Conservation Service developed alternative landscape designs. After reviewing the designs with the Oklahoma Department of Tourism and Recreation, the planning team worked with the Advisory Council on Historic Preservation to be certain that the dam would be compatible with the surrounding landscape. The planning team realized that site location and construction techniques alone would not solve the visual impact problems; the structure would still dominate the landscape.

The team decided to use native plant

materials to contrast with the dam's geometric form and to screen objectionable views. This decision, however, presented another problem: The needed plant materials would take several years to grow to the size required in order to be effective. In addition, a large enough supply of the native species was not available.

To solve the problem, the planning team decided to transplant native species from a wooded area which would be cleared for construction of the dam. Assisting the conservation district and the Black Bear Conservancy District, Loran Zweiacker, SCS district conservationist; Norman Smola, SCS forester; Toby Moss, SCS environmental specialist; and I met on the site and selected 50 trees to be transplanted to locations around the site. The trees included hackberry, elm, redbud, ash, pecan, oak, persimmon, mulberry, and wild plum.

Because the trees were to be moved after they had lost their leaves, making identification more difficult, they were marked with flags of various color combinations to aid in identification during the move. Trees with trunk diameters greater than 1 1/2 inches were not selected because their large root systems could be damaged during the move; with minimal root damage, the trees would have a better chance for vigorous growth the following spring.

A planting plan was prepared showing specific locations for each tree based on color, growth, form, and other characteristics. A tree spade and operators were leased from the State Forestry Division for the relocation.

In order to move the trees in their dormant stage, transplanting took place in December 1978. After being trans-

Loran Zweiacker, SCS district conservationist, checks the condition of one of the transplanted trees.



planted, each tree was generously watered to fill air spaces and provide a good seal between the tree's root ball and its new surrounding soil.

By late fall 1979, only one tree had failed to survive. Its loss was due to damage by rabbits.

Clearing operations for construction will be carefully controlled to preserve as much existing vegetation as possible, and the earth will be shaped and smoothed so construction areas blend with the surrounding landscape. To further minimize the earthen dam's visual impact, it will be seeded, along with other areas requiring vegetation, with native grass seed.

Mr. Thompson is landscape architect, SCS, Stillwater, Okla.

Johnson Creek Revisited

This article is a followup to articles which appeared in the July 1956, January 1961, and June 1965 issues of *Soil Conservation* magazine.

by Frank Richardson
and James Bilyeu

Farmers in the Johnson Creek watershed in western Tennessee like to reminisce about how they banded together 25 years ago to make their lives a little better.

During the midfifties, the upper end of the Johnson Creek watershed in Madison County was pockmarked with 1,650 acres of raw, eroding gullies. Tons of stream-polluting sediment washed from these gullies with each rain. Once-productive bottom lands were being buried under layers of sterile sediment, and streams were filling up. In some areas of the flood plain, sediment deposition amounted to as much as a foot, and one tributary of Johnson Creek had been choked with nearly 4 feet of sediment.

Soil Conservation Service personnel had convinced the farmers that reclamation of the gullied land was technologically possible, but the landowners were not financially able to undertake

such an ambitious effort. However, the landowners discovered that through the then-new Public Law 566—the Watershed Protection and Flood Prevention Act—the needed land treatment was within reach. They applied to the Madison County Soil Conservation District and SCS for assistance.

In another effort to stabilize the gullied land, the district conducted an educational program to persuade the farmers to sign up for financial assistance for tree planting under the Agricultural Conservation Program (ACP). The district borrowed money, interest free, from the local Production Credit Association to buy pine seedlings to distribute to the farmers. As soon as the trees were planted, the district paid the participating farmers the balance of the ACP payment.

Not only did the tree planting program provide money during the winter months when money was usually in

short supply, but it also taught the farmers how to participate in the ACP and created a desire to treat gullied areas. Another benefit that resulted was a fire protection program in the area which was established by the Tennessee Division of Forestry in cooperation with USDA's Forest Service and SCS.

Now, 25 years after the farmers set the first seedlings into place, their labors are bearing fruit. The trees average 10 inches in diameter, producing more than two cords of pulpwood per acre annually, and have produced enough soil-protecting litter to cover the new forest floor to a depth of 4 to 6 inches. The 1,650 acres of gullies have been stabilized.

The Johnson Creek Watershed Program itself was completed in 1965. The five flood control structures, 5 miles of channel improvement, and other technical assistance for land treatment have virtually eliminated flooding. Critically



Twenty-five years ago even small rains overloaded Johnson Creek and sent floodwaters (left) and sediment (right) spreading over the bottom land.



eroding areas were treated with sericea lespedeza, bermudagrass, kudzu, and minor structural measures. Cropland, pasture, and other lands were also successfully treated under the watershed land treatment program.

In the old days, a 3- to 4-inch rainfall would have meant extensive flooding, scouring of topsoil, and deposition of sediment along the creek. But between May 9 and 13, 1975, a total of 6 inches of rainfall failed to cause any flooding.

Several farmers who participated in the watershed program were asked their opinions of the effectiveness of the program. They remembered the risk in crop loss they faced each year in farming the bottom lands. They remembered the years before the floodwater retarding dams were built and the new forests were planted.

During the late spring of 1978, Z. B. Bass, who operates a family farm in the upper end of the watershed, said, "It

has been raining here for 3 days. If it hadn't been for our watershed project, all of our crops in the bottom would have been washed away or at least covered with sediment."

Now the same bottom land fields can be cropped each year with little risk of loss or damages from floods.

Larnell DeBerry, who operates a cotton and soybean farm near the center of the watershed, thinks that local farmers will continue practicing conservation farming even though the project has been completed: "I believe the things we learned about conserving our soil, growing better crops, and working together during project installation will serve to remind us and the generations to come of our responsibility as stewards of the soil. Continued conservation is our aim."

Another Johnson Creek watershed farmer said, "We now know that when a pine seedling is planted in a gully, we

can expect numerous benefits. We have seen the results."

The people of the watershed still share a feeling of fraternity and accomplishment. Their incomes have increased, they have built new homes, their roads have been improved, and they have established recreational facilities.

A return visit to the Johnson Creek watershed shows that the flood control project and other conservation work completed many years ago is still doing its job, making the watershed a safer, more beautiful place in which to live.

Mr. Richardson is land treatment specialist, South Technical Service Center, SCS, Fort Worth, Tex.

Mr. Bilyeu is public information officer, SCS, Nashville, Tenn.



At left, in an effort to stabilize gullies in the watershed, landowners planted thousands of pine seedlings. At right, as SCS Land Treatment Specialist Frank Richardson (right) checks the growth of the trees 25 years after they were planted, local farmer Larnell DeBerry discusses the improvements they have both seen in the watershed over the years.



An Exercise in Optimism

by Shirley Foster Fields

Laurence Van Voorhies is 75 years old. He is a man with a passion for life that is four-dimensional—his grandchildren, other people, conservation, and trees.

His interest in conservation and trees began in 1967 when he purchased 240 acres of woodland a few miles from his home in Seymour, Ind. Three years later, Van Voorhies retired after a 42-year career in retail merchandising.

Today, he is a man in constant motion, demonstrating that forestry is no casual, slapdash pastime, but a highly sophisticated, time-consuming, and rewarding art.

Van Voorhies recalls his long career in merchandising with pleasure. As manager of a variety store in Seymour, he supervised 160 employees and every facet of the retail buying and

selling operation. "The work was stimulating," he said, "with new items always coming in and old items disappearing. I was always ready to go to work in the morning, and sometimes I hated to leave at night. But what did I know about trees or woodland conservation then? Absolutely nothing.

"One spring day when I had retirement on my mind, my wife and I took a drive a short distance beyond town. We stopped on a hill to look down on a valley of dogwood trees. Although I had always admired that valley, I never dreamed I'd own it one day. But, not long after that, I bought that 240 acres of woodland. And it's the best move I ever made."

For Van Voorhies it's been a nonstop love affair with woodlands ever since.

He continuously thinks trees. He especially thinks about the future of trees.

Van Voorhies will tell you that Indiana has 3.8 million acres of forest land, and private owners control 85 percent of that acreage. In 1970, the timber harvest was 351 million board feet, a 40-percent increase over 1949. But, he adds, while these figures look fine on paper, they mask another not-so-cheerful story.

Like almost every State in the Nation, Indiana is losing forest acreage every year to cropland and pastureland as well as to highways, housing, and other forms of urban development. But while our forest lands shrink, the demand for lumber and forest recreation facilities swells.

The goal of soil conservation, Van



As part of his comprehensive woodland conservation plan, Laurence Van Voorhies has cleared and maintained 3 miles of fire lanes in his 240-acre woodland. He has also constructed a 6-acre farm pond to provide fire protection.

Voorhies pointed out, is to: "Use every acre according to its capability, and treat every acre according to its need." First and foremost in southern Indiana, this means: don't denude hilly land of trees.

A few months after he bought his woodlands, he contacted the Jennings County Soil and Water Conservation District for assistance in his new venture. With help from the Soil Conservation Service district conservationist, he developed a long-range, comprehensive woodland conservation plan for his land. The plan is the foundation for every work project that has followed.

Van Voorhies' early interest in forestry was enhanced by serving 2 years as chairperson of the Historic Hoosier Hills Resource Conservation and Development (HHHRC&D) Woodland Committee. He is a charter member and former president of the Indiana Forestry and Woodland Owners Association, Inc., a nonprofit, statewide group of private landowners dedicated to "the total forest resource." In 1973, he was first-prize winner (\$500) of the annual Tom Wallace farm forestry awards competition, sponsored by the *Courier-Journal* and *Louisville Times* newspapers to honor top farm foresters in Kentucky and southern Indiana. He donated the \$500 to the HHHRC&D Woodland Committee in addition to his Agricultural Conservation Program cost share for completing 83 acres of timber stand improvement. In 1975, Van Voorhies was named Indiana Tree Farmer of the Year by the Indiana Hardwood Lumberman's Association, and he competed for National Tree Farmer of the Year. In 1977, the Hoosier Chapter of the Soil Conservation Society of America honored

him for his "outstanding contribution to natural resource management."

With his wife, son and daughter-in-law, and six grandchildren, who are truly fellow conservationists, Van Voorhies has removed vines, brush, and cull trees from his woodlands. He has cleared and maintained 3 miles of fire lanes, constructed a 6-acre farm pond, improved wildlife habitat, and planted more than 17,000 trees.

Indiana is the heart of America's hardwood country. In Van Voorhies' woodlands, the trees are a splendid tapestry, a mingling of conifers and deciduous trees of varying heights, textures, and colors. Although he believes in harvesting trees when they are mature, there are a few towering oak and yellow-poplar trees on his property which he says he will never cut. He hopes that future generations will appreciate their majestic size and beauty. To the century-old stands, he has added 5,000 yellow-poplars, 3,100 walnuts, and 2,200 white pines, all commercially valuable trees.

Since the first cutting in 1972, Van Voorhies has sold 140,000 board feet of timber. Money from the timber sales helped cover the cost of building a cabin in the woods to accommodate his family and the people who come to observe his work.

"Multiple use" and "renewable resource" are common terms among professional foresters, and they apply very well to Van Voorhies' land. His dogwoods, like his giant oaks and yellow-poplars, are cherished for their beauty. His farm pond is for swimming, ice skating, boating, fire protection, and wildlife. And his plantings of 'Cardinal' autumn olive shrubs provide food and cover for wildlife.

Van Voorhies' special pride are his two groves—8 acres in all—of 5-year-old walnut trees. Walnuts are valued the world over, not only for their nuts, but for their use in the manufacture of fine furniture and veneer for interior woodwork and paneling. The recent sale in Ohio of a single mature walnut tree—famed for its exceptionally beautiful grain—attracted bidders from Western Europe and Japan. The purchase price of this one tree was \$30,000. That's much money, yes. But much time also went into the growing of the tree—an estimated 200 years.

A walnut tree is 10 to 15 years old before it bears many nuts, and at least 50 years old before it can be cut for quality timber. Many things can happen between the seedling stage and a mature, top-quality specimen. Soil, insects, weeds, rainfall, spacing, sunlight, and pruning are all important factors in cultivating the valuable tree.

Most critical of all is the soil in which walnuts grow. As the young trees age, their root systems must develop properly. Underlying layers of rock, heavy clay, or poorly drained soil will restrict their full development. For best growth, the trees should have at least 4 feet of loamy, well-drained soil with no restrictions.

The tools for checking the soil are a probe and an auger. Fortunately for Van Voorhies, the man with the tools and the expertise was nearby. SCS Soil Scientist Allan Nickell surveyed the woods, sampled the soil, and located the most suitable sites for planting the walnut trees. SCS District Conservationists Robert Martin and Bob Steiner and Indiana State District Foresters Larry Owen and Joe Schuerman have supervised every other aspect of

woodland conservation on Van Voorhies' property.

Through the assistance he has received, Van Voorhies has learned that observation, patience, and finesse are essential to successful forestry.

European black alder trees play a unique role in Van Voorhies' walnut groves. One hundred are interspersed among his walnut trees in a deliberate mixed planting of the two species. Why? The black alder is a nitrogen-fixing tree, and thereby enriches the soil. But even more important is its role as a "trainer tree." Black alders grow faster than walnuts. When the two species compete for light, the straight-growing alder forces the walnut trees to grow straight also, thereby immensely increasing the value of every walnut tree.

It is natural to ask Van Voorhies: "Why do you, at age 75, plant and prune and caringly minister to every need of 3,100 walnut trees that you will never see grow to maturity?"

There is nothing mysterious about this tall man from Indiana. He replies with a wink, "I will never see the full-grown trees. But my grandchildren will."

And therein lies the heart of the matter. There is something more valuable to him, perhaps, than even a tremendous dollar return on his walnut trees.

Like the forest itself, this "something more" is a treasure. It is a mixture of happenings and impressions, of richly textured memories. The remembering spans 12 years and centers upon six young people: Katie, Paul, Brian, Lisa, Pamela, and Kim. These are Van

Voorhies' grandchildren.

"The children have learned to love the woods and all the creatures in it. They understand life's continuity. They know, too, that this isn't a throw-away world. Beauty is worth tending."

What does it mean to Van Voorhies himself? For him, the forest is an exercise in optimism.

Ms. Fields is a public information officer, Information Division, SCS, Washington, D.C.



Van Voorhies (left) and Gary Ross, former service forester with the Department of Natural Resources, survey growth of a mixed black walnut and poplar plantation. Van Voorhies planted autumn olive along field boundaries for wildlife.

Teamwork in Forest Reclamation

by Douglas D. Sorenson

A U.S. Army Reserve unit in Wisconsin is gaining a reputation for being conservation minded.

The 397th Engineer Battalion headquartered in Eau Claire, Wis., has accomplished thousands of dollars worth of conservation work while carrying out a training exercise. The engineers brought about 75 pieces of equipment and 300 men into a county and State forest to rehabilitate it after a fire raged through in spring of 1977.

The exercise, dubbed "Operation Pushover," was aimed at knocking down the burned tree snags to make way for machine tree planters. The idea began with the Golden Sands Resource Conservation and Development (RC&D) area in central Wisconsin where the Jackson County Forest and Black River State Forest are located.

A year after the fire, the RC&D forestry advisory committee observed that jack pine seeds were not germinating in the burned area. State and local foresters advised that new pines would not return naturally and would have to be machine planted.

Clearing the area for planting could be a costly part of the operation, and that's when the forestry group decided to get the army engineers involved.

"This was a beautiful opportunity for the men to learn how to use their equipment and at the same time do a job to benefit the public," said Lt. Col. David La Fontaine, commanding officer of the battalion.

In mid-August 1978, advance units staked out the work areas, moved in some equipment, and tested procedures. The planning was a real team effort for the army, Jackson County Forest Administrator Merlin Lambert, Wisconsin Department of Natural Re-

sources Forester Robert Hess, and other county agencies.

On a September training weekend, the 397th Engineers moved in with eight bulldozers, eight front-end loaders, 35 dump trucks, several road graders, two draglines, and a few pieces of borrowed equipment. Several days later 200 of the 20,000 acres of burned forest had been prepared for tree planting.

The clearing required some experimentation by the engineers. The big trees were cleared easiest by bulldozing and windrowing. Smaller trees were rolled over and chopped on the ground. In the months following the fire, some of the usable timber had been salvaged.

Other conservation measures were given some military support while the army engineers were on hand. Five miles of fire lanes and access roads were widened and improved, and 1½ miles of new roads were built. Two areas were cleared for ponds 100 feet in diameter and up to 15 feet deep that will provide water for emergencies and habitat for wildlife.

Recreation was given a boost from the engineers when they rebuilt three washed-out bridges on the snowmobile trails that crisscross the forest. The bridge timbers were sawed from the salvaged oak in the burned-over area.

Other salvaged timber will be cut into half logs to improve fish habitat in trout streams. This is an associated measure sponsored by the River Country RC&D area in west-central Wisconsin. Timber used by the reserves was sawed by the 457th Engineers army reserve sawmill unit in Hurley, Wis.

Both the military and the foresters are pleased with the good image that Oper-

ation Pushover presented to the public. It was a blend of ideas and cooperative effort among several government agencies.

Golden Sands RC&D Coordinator Robert Dawson said that this kind of project could be done in other areas, but he pointed out that the project has to be appropriate as a training exercise. "This project fit the army reserve engineers perfectly," he said. "Their heavy equipment was what we needed to get the job done. We could not expect an infantry or artillery group to take a job like this just to save some public money."

In the spring of 1979, 300,000 coniferous seedlings were planted on the areas prepared the previous fall by the reserve unit.

In the summer of 1979, a Wisconsin army national guard unit, the 264th Engineer Group, conducted training which resulted in the clearing of an additional 80 acres of burned-over forestland in preparation for new plantings.

Army engineer units are frequently asked to take civilian jobs to save public money. If the job is appropriate—and if it does not compete with private contractors—this can be an ideal cooperative arrangement to get conservation jobs done and at the same time provide valuable training for military units.

Mr. Sorenson is educational resource conservationist, River Country RC&D, SCS, Eau Claire, Wis.

More Than an Apple a Day

"Like everyone who works the land for a living, we are at the mercy of many unseen and unpredictable factors. Any one of them can mean the difference between profit or loss," said fruit grower Doug Yeary.

Yeary's interest in orchards goes back to his childhood when his father operated a small orchard near Cincinnati, Ohio.

In 1963, Yeary bought the 170-acre Muskingum County farm in east-central Ohio from Louis Abele. Abele had planted the first orchard there in 1937 and set a pattern for the land use that remains today.

"We started with what was there,"

said Yeary. "But we have replanted, rebuilt, or added new things almost every year to improve our efficiency and production."

By planting 500 to 1,200 fruit trees every year, the entire orchard has been replanted since 1963. The orchard is a family operation with Yeary, his wife Betty, and two children, Terry and Doug, doing most of the work. Extra people are hired to help with picking, bagging, and sorting fruit at harvest-time.

The main crop is apples. The Yeary family now has 90 acres of apples and 10 acres of peaches. "We are going to phase out the peaches because of the

hard winters in Ohio in recent years. But we do plan to expand the operation to include plum trees, pear trees, nectarines, and raspberries," Yeary explained. "I also grow a little corn on the rest of the farm that is not in woods."

Two major problems for the Yearys' orchards are collar rot and deer damage. The soils on the farm are very heavy with high clay content. They hold a lot of moisture which causes the trees to rot near the ground.

"We are getting soil information now from the Soil Conservation Service. The SCS soil information helps us locate new trees on sites with better drainage and helps solve other drainage problems on the farm," said Yeary.

Deer ruined more than 600 trees in the Yearys' orchards last year. Replacement cost was about \$1,800. "Rodents also damage some trees every year," Yeary added. "We spend hours and hours installing tree guards to keep rodents away from the tree base."

"In the spring and fall we really hustle around here," said Yeary. "The pressure is on. In the spring we begin our fertilization program. Spraying operations also begin early in the spring and continue throughout the summer. We usually spray about 20 times a year."

"A late frost can wipe out a whole year's crop, so frost protection is critical when the trees are in bloom," Yeary continued. "At one time we considered irrigation for frost protection. SCS helped us find a good pond site, surveyed the pond, and gave us an idea how much water the pond would hold—compared to what we would need to irrigate—and a cost estimate to build the pond. I used this information to select a frost protection system. I decided a wind machine was cheaper."



Fall is one of the busiest seasons for fruit grower Doug Yeary. Handpicking apples at harvest-time is only one of numerous activities the Yeary family is engaged in.

The wind machine circulates the air, drawing the warm air layer down. This warms the air temperature by 1 or 2 degrees which doesn't sound like much, but with the air movement, frost doesn't settle on the blooms. "It does the job for us," added Yeary.

During the summer months, the Yearys are busy with spraying and mowing. They also thin apples by hand to produce larger fruit. They attend meetings that provide information about new products and techniques. "Education is as continuous as the work in our business," said Betty Yeary.

In the fall their business starts for real: Fruit is picked, hauled from the field, washed, graded, bagged, and stored until it can be shipped to market. "Our storage problem was just about eliminated when we added a new refrigerator room that stores about 8,000 bushels," said Yeary.

"Our apples are graded by hand for quality, shape, and color," explained Betty. "Apples not meeting number one grades are used for cider."

The cider is made with a large hydraulic press that produces about 250 gallons of cider per hour. A jugger allows the Yearys to fill five 1-gallon jugs at the same time. Much of the cider is stored in a new freezer unit that holds 7,000 gallons.

In the winter, every tree must be pruned. Dead or unwanted limbs have to be removed for healthier trees. Ladders, machinery, and buildings are repaired and made ready for another season.

The Yearys are remodeling one room of an old barn built in 1815 for a retail salesroom. "We have added jellies, jams, and apple butter to diversify our sales," said Yeary.

The produce is shipped to the large market outlets in Columbus, Cleveland, and Cincinnati. "We also sell fruit through the American Fruit Growers Marketing Association," said Yeary.

Yeary's spare time is limited in the fall. The work begins at daylight. He manages the picking operations, the packing house, and retail selling. Cider making and the bagging of fruit are usually finished by 10 p.m. Yeary leaves the farm at midnight to deliver to the wholesale houses. "They usually accept deliveries at 4 a.m. This puts me back home at 8 the next morning, in time for breakfast and 3 or 4 hours of sleep before I start all over again," said

Yeary. "My wife Betty helps manage the retail sales and bagging operations, or I couldn't make it."

"Our farm is now worth many times the purchase price and production has increased each year," continued Yeary. "We produced about 12,000 bushels of fruit this year. I would guess that our produce will provide over 70,000 families with fruit and cider."

"It may not be the easiest work, but it's our life and we enjoy it."

Mr. Goins is civil engineering technician, SCS, Coshocton, Ohio.

Frost protection is critical to a successful fruit growing business. Yeary asked the Soil Conservation Service for help when he was selecting a frost protection system. The wind machine, which circulates the air, proved to be the cheapest method for the Yearys.



A Winning Way

Teacher of the Year

Winner of the NACD-Allis-Chalmers Conservation Teacher of the Year award for 1979 is Jeannie Pratt, who teaches a gifted children's program for second through eighth grades at Whitebead Elementary School near Pauls Valley, Okla.

As the national winner, Pratt will receive a check for \$1,000 and an expense-paid trip to the NACD annual conference at Houston, Tex. This makes two winners in a row for Oklahoma. Last year's Conservation Teacher of the Year was Terry Joe Shaw of Stillwater Middle School.

In developing her environmental education program, Pratt and her students bypassed formal textbooks. Students researched information on natural resources and planned their own projects with help from local resource special-

ists. Eventually, the entire school had a part in the program.

"We have no textbooks," Pratt said. "The world is our text. Perhaps all teachers should throw away their textbooks and depend on their own ingenuity and that of their students for ideas on which to build a program."

Pratt said that her environmental studies program covers all of the basic educational skills while reaching out to new activities that require observation, perception, research, and decision-making.

When the students investigated an open sewer and trash dump near the school site, their studies of soil, water quality, land use, and energy took on broader significance. Students took photographs, collected soil and water data, drew maps, and developed a plan

to clean up the area so that they could extend their outdoor classroom projects.

The students then presented the results of their investigation and their plan for improving the situation to the school board. The board voted unanimously to approve the plan and the county commissioners supported the project.

The whole school joined in planting trees on the schoolyard and sprigging bermudagrass around a sewage lagoon. Plantings were also made to provide food and cover for wildlife. Pratt's third and fourth graders led students along a learning trail and explained different study sites.

Pratt's students also researched and made costumes for "Bird Talk," an operetta by the National Wildlife Federation, and presented it to the school. For an oral history segment on the Dust



Jeannie Pratt and three of her students check the growth of one of the conservation plants that students at Whitebead school planted. The plants will provide food and cover for wildlife and will screen the sewage lagoon shown in the background.

Winning District

Bowl years in Oklahoma, one of Pratt's students interviewed her own grandmother for a firsthand account.

The multidisciplinary program at Whitebead resulted from a summer session that Pratt spent at East Central Oklahoma State University in environmental education classes. It was during the outdoor classroom studies that Pratt got the idea for extending learning opportunities for her gifted students through conservation.

As the environmental studies program developed at Whitebead school, Soil Conservation Service Soil Conservationist Paul May helped with the soil and water studies and provided other resource information. The Oklahoma State Forestry Division furnished technical help and seedlings for tree planting. The Garvin County Conservation District, which sponsored Pratt for the conservation education awards program, provided soil testing kits and signs for the outdoor classroom.

Runner-up for Conservation Teacher of the Year is Vendell Creed Tenney, science teacher at Buckhannon-Upshur Middle School in West Virginia, sponsored by Tygart Valley CD. His award is a \$500 check.

Other regional Conservation Teacher of the Year winners include: Southeastern region, Ruby Birmingham, Gaston SWCD, Dallas, N.C.; Northern Plains region, Marcella Houser, Lower Platte North NRCD, David City, Nebr.; Southwestern region, Audrey Allmon, Delores SCD, Cortez, Colo; Pacific region, Norman Weitzel, Washoe-Storey CD, Reno, Nev.; and North Central region, Paula Doyle, Mahoning SWCD, Canfield, Ohio. Each regional winner receives a \$200 award.

The Coconino Natural Resource Conservation District (NRCD) in Flagstaff, Ariz., has a winning way with conservation education. In 1977, Jim David, a teacher at Flagstaff Junior High, won the Conservation Teacher of the Year Award sponsored by the National Association of Conservation Districts (NACD) and Allis-Chalmers. In 1979, the Coconino NRCD took first place in the district competition of the NACD-Allis-Chalmers Environmental Conservation Education Awards Program.

"Jim David really got things started in the district with the pond project at Flagstaff Junior High," said David Parkman, environmental education coordinator for the NRCD. (See "Outdoor Study Center Rises from Mudflat," October 1977 *Soil Conservation*.) Since then local educators' interest in developing en-

vironmental education programs for all grades has boomed. To meet the increasing requests for assistance, the district hired Parkman in 1978 with funding through the Comprehensive Employment and Training Act of 1973.

With help from the district's education committee, Parkman evaluated environmental efforts already under way in the district, identified sources of learning materials available to schools, and established an environmental education library with district support.

To encourage schools in their efforts to develop environmental education programs, the members of a district conservation youth board sponsored a citywide Conservation Week. The youth board put together a 78-page booklet entitled "A Teacher's Resource Guide for Conservation Week." The booklet



Jim David and biology students evaluate pond microbiology at the Flagstaff Junior High School outdoor study site. David is credited with generating the interest in conservation education that eventually made the Coconino Natural Resource Conservation District a winner.

contained study guides for teachers of kindergarten through 12th grade to use with their classes in learning about conserving soil, water, air, wildlife, and human resources. The activities required students to use their math, science, writing, and other skills. The youth board also arranged for speakers to address school assemblies on environmental issues.

Jim Alam, Soil Conservation Service district conservationist at the Flagstaff field office, assisted the youth board with the project. Alam also provides technical assistance to district schools in developing their conservation education programs. When teachers need help with an outdoor study project, Alam makes sure they find the right resource person to provide it.

Other agencies and community groups that have provided assistance and support for the district's environmental education effort are USDA's Forest Service, the Arizona Game and Fish Department, the Youth Conservation Corps, Northern Arizona University, the Alpine Garden Club, and several community businesses. The Alpine Garden Club donated \$500 and a lumber company donated wood chips for school site projects and learning trails.

The outdoor study area at Flagstaff Junior High is now used by students from all of the schools in the Flagstaff School District and by students from Northern Arizona University. Two elementary school sites in the city have developed outdoor classrooms for environmental studies, and adjoining school districts have become interested in developing an environmental education program.

Also as a result of the interest in outdoor studies generated by the Flagstaff

Junior High project, the NRCD is currently working with the county parks and recreation department on developing a 20-acre environmental education and recreation facility. The district is now also involved in the planning of a 400-acre environmental study area set aside by the Forest Service.

"We try to fit the community resources to the needs of the schools and other groups interested in outdoor studies," said Parkman. Currently, the environmental education advisory committee—which is made up of community leaders, educators, and members of the Audubon Society and other conservation organizations—is helping implement a 5-year environmental education plan for county school districts.

During the first year, which is the stage they are working on now, the committee will develop conservation education curriculums for all grades in a form accessible to teachers. During the second year, the committee will concentrate on providing inservice teacher training. In the third year, it will assist in the development of outdoor classrooms at many schools in the county. In the fourth year, the committee will work on developing a countywide camp for grades 6 through 10. In the fifth year, the committee will concentrate on disseminating information on the progress of the district's environmental education program.

"The NRCD board of supervisors are dedicated to promoting conservation education," said Parkman. "They consider education one of their primary functions as a conservation organization. While they put special emphasis on environmental conservation education for young people, the board members are also dedicated to providing

outdoor learning experiences for adults and the general community."

For placing first in the NACD-Allis-Chalmers Awards Program, the Cocino NRCD will receive a check for \$1,000 and an expense-paid trip for a selected district leader to the NACD annual meeting in Houston, Tex.

Runner-up in the district competition is Morris County Soil Conservation District, Morristown, N.J. The district will receive a \$500 check for its broad-based conservation education program under the direction of a full-time coordinator employed by the district.

Regional winners, who will receive \$200 each, are: Southeastern region, Davie SWCD, Mocksville, N.C.; North Central region, St. Charles County SWCD, St. Charles, Mo.; South Central region, Crescent SWCD, Metairie, La.; Northern Plains region, Morton County SCD, Mandan, N. Dak.; and Pacific region, Topanga Canyon RCD, Topanga, Calif.

Ms. Mergen is head of educational relations, Information Division, SCS, Washington, D.C.

New Publications

Meetings:

Irrigation and Drainage in the Nineteen-Eighties

by the American Society of Civil Engineers

This is a collection of 54 papers and abstracts presented at the 1979 Irrigation and Drainage Division Specialty Conference held in Albuquerque, N. Mex., July 17-20, 1979.

The articles cover such topics as energy conservation, water quality and quantity, regional drainage prospects, research, and ground water law.

Photographs, tables, charts, graphs, maps, and diagrams accompany the articles, and a list of references follows.

The articles were published by the American Society of Civil Engineers, 345 East 47th Street, New York, N.Y. 10017. Single copies of the publication are \$20.

Soil Surveys Published

Alabama: Cleburne County.

Colorado: Pueblo Area.

Georgia: Clayton, Fayette, and Henry Counties, and Lowndes County.

Indiana: Posey County.

Kentucky: Boyd and Greenup Counties.

Michigan: Ingham County.

Minnesota: Cottonwood County.

Mississippi: Itawamba County and Lowndes County.

Nevada: Carson City Area.

Oklahoma: Choctaw County.

South Dakota: Beadle County and Campbell County.

Texas: Jim Wells County.

Washington: Northferry Area.

February

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| 10-14 | National Association of Conservation Districts Convention, Houston, Tex. |
| 11-15 | Society for Range Management, San Diego, Calif. |
| 15-18 | American Association of School Administrators, Anaheim, Calif. |
| 20-23 | Land Improvement Contractors of America, Phoenix, Ariz. |
| 23-27 | The Irrigation Association Technical Conference, Houston, Tex. |

March

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|-------|--|
| 9-14 | The American Society of Photogrammetry, St. Louis, Mo. |
| 16-18 | American Pulpwood Association, New Orleans, La. |
| 21-23 | National Wildlife Federation, Miami, Fla. |
| 22-26 | North American Wildlife and Natural Resources, Miami Beach, Fla. |

April

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| 2-3 | Annual Symposium on Engineering Geology and Soils Engineering, Boise, Idaho |
| 12-17 | American Planning Association, San Francisco, Calif. |
| 13-16 | Association of American Geographers, Louisville, Ky. |
| 14-18 | American Geophysical Union, Washington, D.C. |
| 15-17 | International Symposium on Livestock Wastes, Amarillo, Tex. |
| 16-18 | Hardwood Plywood Manufacturers Association, Charleston, S.C. |
| 27-29 | Chamber of Commerce of the United States, Washington, D.C. |
| 27-30 | The Garden Club of America, Norfolk, Va. |

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March 1980

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A New Era in Conservation Communications

From the Administrator

Next month as we observe the 45th anniversary of the Soil Conservation Service, we also will begin a new venture in conservation communications.

Soil Conservation, authorized and first published in August 1935 as the official organ of SCS, will become *Soil and Water Conservation News*.

The new format as a newsmagazine represents an attempt to be more responsive to the needs of our primary audience—district governing boards and SCS personnel at all levels—for more news of significant developments affecting conservation of soil, water, and related resources.

A USDA task force created last year to review agency publications was empowered by Secretary Bergland to recommend changes in any of the Department's 26 periodicals. The task force recommended that SCS make its periodical more responsive to its intended audience.

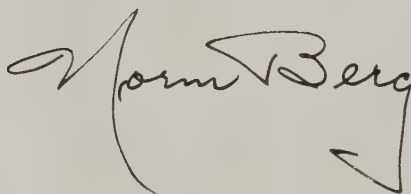
What will *Soil and Water Conservation News* do differently or better than *Soil Conservation*?

The newsmagazine, first of all, will allow SCS to increase the number of articles even though the periodical will decrease in size, from 24 to 16 pages, and to save in printing and related costs. At the same time, we will be able to increase the timeliness of our reporting in an era of fast-breaking developments in the whole field of natural resource conservation.

There is an urgent need, for example, for timely reporting of progress under the Soil and Water Resources Conservation Act. As for the diverse water quality problems associated with nonpoint source pollution, there is a need for greater sharing of research results, techniques, and methods that work well in controlling or solving these problems. In the heretofore largely untouched area of conservation management, there also is much to report and share with our audience.

Soil Conservation has served conservationists and the public well in reporting the changes in conservation for the better part of the last half century. It will remain an invaluable record of the conservation movement as it has evolved in our Nation and abroad. It also is eloquent testimony to the many accomplishments of SCS and its primary partners, the conservation districts.

As we bid a fond farewell to a periodical that met our needs in more leisurely times, we heartily welcome the soon-to-be-born *Soil and Water Conservation News*. It will record and reflect so many of our efforts and hopes in the "Action Eighties" and beyond.

A handwritten signature in black ink, reading "Norm Berg". The signature is written in a cursive, flowing style. The first name "Norm" is written with a large, sweeping "N" that extends under the "B" of "Berg". The "B" is also large and loops around the "E" and "R". The "G" is smaller and ends with a simple hook. The signature is positioned in the lower half of the page, below the main body of text.

Soil Conservation is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil Conservation* was last authorized by the Director of the Office of Management and Budget on June 21, 1979.

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Soil Conservation Service

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Cover:

This minimum-tilled cornfield in Baltimore County, Md., is typical of the 55 million acres of cropland on which farmers used various forms of conservation tillage in fiscal year 1979. Fifteen years ago, farmers used conservation tillage on only 4 million acres. (See "Conservation Highlights 1979" beginning on page 17.)

RAMP Progress

First RAMP Contract Awarded

by Ted Kupelian

Nearly 2,500 landowners have signed up to participate in a nationwide program to reclaim abandoned non-Federal coal-mined land. The Rural Abandoned Mine Program (RAMP) is one of four programs authorized by Title IV of the Surface Mining Control and Reclamation Act of 1977. Under RAMP, the Soil Conservation Service provides cost-share funds and technical assistance to land users and administrators the program in cooperation with the U.S. Department of the Interior, State and local governments, private landowners, and soil and water conservation districts.

Because funds are limited, RAMP will concentrate on the more severe problems first. First priority is the protection of public health, welfare, safety, and property from extreme danger caused by past coal mining. Second priority is the protection of public health, safety, and general welfare from adverse effects of mining, and third is the restoration of the environment where it has been degraded.

The following 21 States have received applications for reclaiming rural abandoned coal-mined lands under the program: Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Missouri, Montana, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, West Virginia, and Wyoming.

West Virginia, with 84,868 acres eligible for reclamation under RAMP, is where the first contract was awarded.

The residents of Junior, W. Va., are proud to be the first to be awarded a contract under the Rural Abandoned Mine Program (RAMP)—and relieved. Through the program, the town of 500 will be able to reclaim a dangerous abandoned coal mining site where local children played despite warnings from their parents.

Sheldon Findley, Soil Conservation Service resource conservationist, said, "Children would play outside the mines and when they got hot, they would crawl back into the mines to cool off. The children would also play in the charcoal ovens, and they had even set up benches in one of the ovens. At the site, children have stepped on nails and run them into their feet, but luckily so far no one has been lost in the deep mines."

Besides presenting a real danger to children in the area, the abandoned mine site was contributing to pollution of the Tygart River. Eroded material from a spoil pile and acid water from all four mine openings eventually entered the river.

The 12-acre tract of abandoned coal mined land in Junior presented a hazard to public health, safety, and welfare. Reclamation work under the 5-year, \$113,000 RAMP contract will include sealing four open mine shafts, regrading a highwall, removing a refuse pile, and leveling a decaying minewaste processing structure. A large pile of mine refuse will be smoothed and covered with soil.

A Junior resident and principal landowner of the mined site, Charles Hillyard, leased 8 acres of the mined land to the town for the reclamation project. "I had read about RAMP and was very interested in it. So, when SCS personnel approached me about the town's reclamation plans, I was glad to participate," Hillyard said.

The primary objective of the reclamation work in Junior is to eliminate public hazards. Secondary objectives include improving the environment and using the land for wildlife habitat, pasture and hayland, and recreation.

Mayor of Junior, Leon Stevenson, said, "The children here have never



SCS District Conservationist Michael Marks examines one of four mine openings which will be sealed to prevent access to the mine interior, thereby eliminating a safety hazard to children playing in the area.

First Two RAMP Projects Completed

by Corey Bernat

really had a safe place to play. This is a small town and we just do not have the recreational facilities of larger towns."

Stevenson said that after reclamation the town hopes to build a baseball diamond, a combination basketball and volleyball court, and a tennis court on part of the land.

The residents of Junior are grateful and proud to have been awarded the first RAMP contract. As a result of the program, and the willingness of the involved landowners, the southern town limits will soon wear a new face, highlighted by recreation facilities for the entire community to enjoy.

Mr. Kupelian is a writer-editor, Information Division, SCS, Washington, D.C.

Although a West Virginia town was awarded the first RAMP contract, Pennsylvania can claim the first two completed projects. Much smaller than the West Virginia project, the two in Pennsylvania involved only about 1 acre each.

The first completed Pennsylvania project, located on church grounds in Bedford County, presented a danger to neighborhood children who played there.

Under the RAMP project, two air shafts were closed by excavating the area and filling the shafts with crushed stone. Two mine entrances were filled in with mine refuse and pieces of concrete from old structures on the site. A large concrete block, which had been a tippie base, was buried. Soil from the excavation was used to provide a base for seeding fescue.

The second of the Pennsylvania projects was located in Greene County only 1,000 feet from a high school. Landowners Brian and Bruce Blair, knowing that an open mine shaft on their land presented a danger to youths playing in

the area, asked Soil Conservation Service District Conservationist Karl Niederwerfer to help in closing the shaft.

Niederwerfer took the problem to the local RAMP committee and the Blairs' application for assistance was chosen as a high priority project. Work was undertaken to excavate around and fill in the shaft. Then the area was leveled and seeded to fescues.

After the work was completed, Theodore Carlson, principal of the nearby high school, said, "Now I can breathe a sigh of relief. To have an open shaft like that near a populated area is dangerous."

Completion of the projects in Bedford and Greene Counties leaves Pennsylvania with about 240,000 acres of unreclaimed or inadequately reclaimed abandoned mine land. Pennsylvania has the highest acreage of rural abandoned coal-mined land eligible for reclamation under RAMP.

Mr. Bernat is public information specialist, SCS, Harrisburg, Pa.



A section of the abandoned mine site in Junior, W. Va., will be graded, covered with soil, seeded to grass, and used for community recreation.

A Prairie for New Hampshire

by Frederick B. Gaffney
and David N. Allan

The last glacier retreated from New Hampshire about 10,000 years ago, leaving behind a rich mantle of gravel and sand which has been mined at a rapid rate. Today in many areas, barren gravel pits are all that remain after the mining. The scarred land is recovering gradually as plants seed in from nearby areas, but natural plant succession takes years. Meanwhile, communities adjacent to the mined areas must look out over the open, scarred land.

A typical example of this situation is the gravel pit owned by the Public Service Company of New Hampshire in Londonderry. The company had mined a large esker, or gravel ridge, under a powerline right-of-way, exposing a strip of sand and gravel. Initiating a town beautification project, the Londonderry Conservation Commission decided to plant shrubs to screen the pit. At the same time, the Soil Conservation Service was searching the Northeast for sites on which to make field evaluation plantings of native grasses. SCS was trying to determine the effectiveness of using warm season grasses for re-vegetating gravel pits.

When Jim Hayden, SCS district conservationist in Rockingham County, learned of the Londonderry site, he contacted the Public Service Company to see if SCS could use the gravel pit as a field evaluation planting site under the conservation commission's project.

The Public Service Company was pleased to cooperate. Hayden and Socrates Macriganis, the Public Service forester, worked out the details of land use and made up a work plan. The company leveled the site with a bulldozer and erected a fence to discourage motorbikes from crossing the area.

John Connor, a Rockingham County

Conservation District supervisor, and his brother-in-law, Daniel Hicks, provided equipment and took time from their busy apple orchard business to help install the vegetation plots over a 3-year period. They supplied tractors, lime spreaders, and a disk harrow.

First they disked the area to make a uniform seedbed—a difficult task in cobbly gravel. Then they spread the lime and harrowed it in. The plots were staked in a grid pattern and hand seeded to various grasses. They then hand mulched the plots with old hay, using a straight disk harrow to cut it into the gravel. This was an important step in anchoring the mulch. A previous seeding of crownvetch and birdsfoot trefoil, established by a contractor for the Public Service Company, lost its mulch to strong winds a few hours after seeding as long windrows of hay rolled across the gravel pit.

Plants seeded into such low fertility sites need to establish and persist in order to provide water and dust erosion control with a minimum of maintenance. This requires the use of plants typical of the Prairie States, such as switchgrass and big and little bluestem. These plants have good potential for reclaiming sand and gravel pits. They are slow to establish, however, requiring the use of good clean mulch held in place. If the mulch is blown off, a seeding failure can be expected.

Plantings should not be fertilized at the time of seeding, because fast growing weeds within the mulch would soon smother the slow growing grasses. Fertilizing 1 year after seeding, when the grasses are actively growing, will give the plants a good boost to compete with any weeds. No further maintenance is required.

The trial plots included plantings of legumes such as birdsfoot trefoil, crownvetch, and 'Lathco' flatpea. These can be successfully used if the ground is seeded properly and if the seed is inoculated with appropriate bacteria that fix nitrogen in association with root growth. However, if unconsolidated deep sands are present, warm season grasses may be a better choice, especially little bluestem. The "perfect" seeding mixture and least costly method of establishment which will insure protection to such areas are still being sought by SCS.

In Londonderry, what was once a blight on the land has been changed to a waving, shoulder-high stand of big bluestem and switchgrass. With a little imagination, one can picture that great sea of grass that once welcomed settlers as they pushed west across the prairie.

Mr. Gaffney is plant materials specialist,
SCS, Syracuse, N.Y.

Mr. Allan was biologist,
SCS, Durham, N.H., and is now retired.

Santa Teresa—A Model of Conservation Foresight

by Marjorie Johnson
and John Allen

"Conservation is crucial but often ignored by developers," said C. L. "Charley" Crowder, developer of the Santa Teresa subdivision in Dona Ana County, N. Mex. But Crowder hasn't ignored conservation in his work.

Crowder, a cooperater with the La Union Soil and Water Conservation District, used soil survey, hydrology, and drainage information provided by the Soil Conservation Service and State and private agencies when he developed the 7,200-acre Santa Teresa subdivision 11 miles northwest of El Paso, Tex.

"The first thing we did before acquiring the property was a drainage study," said Crowder. "We wanted to be sure we could control the drainage. Average annual rainfall is only 8 to 10 inches, but it often comes in two or three downpours. The soil is porous; but when it's covered with concrete, everything changes.

"We used drainage information provided by SCS to determine where the water would go and to locate streets where the drainage would best be handled," explained Crowder. "One of the most important things we do is what we don't do. For example, scraping the land and removing vegetation doesn't make sense to us. We tried to develop plans that would make the subdivision fit the land and not the other way around."

Crowder contracted with a private consulting group to make a detailed soil survey. The survey data were based on criteria used by SCS in compiling soil information. The survey shows five different soil types within the boundaries of the subdivision.

"The soils range all the way from sugar-sand to hard clay," said Ron

King, project engineer. "We kept the clay areas with high shrink-swell properties in open space. That soil is all right for recreation, but special construction methods are required if a structure is built on it."

Some of the clay is used to "plate" the bare building sites to control wind and water erosion. King said this works very well even though builders aren't enthusiastic about the practice. "We ask them to till the clay into the soil to increase the water-holding capacity," King said, "but most of them scrape it off when they get ready to build."

Clay was also used to seal the bottom of the six lakes on the two 18-hole golf courses.

"All the lakes have been stocked with bass and catfish, and one of the lakes stores irrigation water for the greens," said King. "The lakes have water-level recorders in them. In our agreement with the New Mexico State Engineer's Office, we are required to 'pay back' water to the Rio Grande River. When the water in the lakes reaches a certain level, it is automatically released to flow to the river."

Drinking water for more than 175 homes already built comes from some of the 32 wells in the subdivision. "In the planning stages, we concerned ourselves with the basics," Crowder said. "In this part of the country, that means water. We drilled for it and developed a supply that can satisfy the needs of 60,000 people. Each well will yield about 800 gallons a minute."

In New Mexico, any development that affects soil and water resources must meet certain requirements of the soil and water conservation district. The district's review responsibility lies primarily with that part of the subdivision plan

that deals with terrain management. The district gives its opinions to the county commissioners on two separate issues: conformance with county and State regulations and whether or not the developer can fulfill the proposals contained in his or her disclosure statement.

Included in the district's review are:

- Terrain management plan;
- Drainage plan, hydrology computations, and water control structures;
- Existing contours and lot locations;
- Soil information;
- Flood plain management; and
- Road and street locations and slopes.

"Federal, State, and local governments have strict regulations to meet," Crowder said, "but every one is necessary. What we do now will affect many people. We couldn't afford to cut corners even if we could get by with it.

"We have depended heavily on SCS," he said. "We used soil survey, drainage, and other information from the first step to where we are now."

Ms. Johnson was public information officer,
SCS, Albuquerque, N. Mex.
Mr. Allen is district conservationist,
SCS, Las Cruces, N. Mex.

Partnership for Plants



With its nursery beds reaching toward Bismarck in the background, the Lincoln-Oakes Nursery shares land with the Bismarck Plant Materials Center. At the two facilities, SCS and the North Dakota Association of Soil Conservation Districts work together to improve conservation plant materials.

In the northland, helping and sharing are a way of life. The cold, harsh winters and sometimes dry, windy summers demand a mutual dependence between people and natural resources, for survival's sake. However, proper conservation of these resources demands awareness and attention from everyone concerned with the future. When individuals plant trees and grass, they are practicing beneficial and visible forms of soil conservation.

Not only do individuals work together to satisfy the needs of the land, but many agencies, organizations, associations, and other groups also share the techniques and resources available to accomplish common goals.

A prime example of such a close working relationship and common concern is the Lincoln-Oakes Nursery at Bismarck, N. Dak., operated by the North Dakota Association of Soil Conservation Districts (NDASCD), and the Bismarck Plant Materials Center (PMC), operated by NDASCD and the Soil Conservation Service. SCS and NDASCD have worked together for more than 30 years to improve grasses, shrubs, and trees for use in conservation programs in North Dakota. Many of the improved plant materials developed through this cooperative work have also made substantial contributions to the conservation programs in Minnesota, Montana, and South Dakota.

"The two agencies are a good combination," SCS PMC Manager Russ Haas said. "SCS provides the selection and development of improved trees, shrubs, and grasses and the association's nursery provides production and distribution of these released materials to soil and water conservation districts.

"Presently," he continued, "we have

a greenhouse for budding and grafting plants, and a modern, fully equipped seed-cleaning plant. We also have a building leased from the association that has room for an office, grass seed and machinery storage, and a recently installed cold storage unit for woody plants.

"Our close relationship with the association and the Lincoln-Oakes Nursery has proved to be a very viable one," Haas explained. "It provides a unique opportunity for final field testing of plants under a wide range of soil, climatic, and management conditions."

From 1937 to 1953, SCS operated a nursery for the production of grasses, trees, and shrubs. The site originally was located at the USDA Science and Education Administration-Agricultural Research station near Mandan, N. Dak. Some time before 1953, the operation was moved to an area of bottom land between the Heart and Missouri Rivers and Bismarck and Mandan. Due to the potential flood hazard, a new site was obtained south of Bismarck, across from old Fort Lincoln. During the winter of 1953, the buildings from the old site were moved to the new Fort Lincoln site and, appropriately, called the Fort Lincoln Nursery.

In late 1953, the U.S. Department of Agriculture discontinued all SCS nurseries, and the operations of the Fort Lincoln Nursery were turned over to the NDASCD and became what is now the Lincoln-Oakes Nursery. NDASCD nursery operations had previously been carried out on a 50-acre nursery in Oakes, N. Dak. The agreement called for granting all equipment, material, and growing stock to the association. The buildings and land were provided on a long-term lease.

In 1956, title to the land and buildings was transferred to the State of North Dakota by the Federal Government. The control, custody, possession, supervision, management, and operation of the lands were vested in the NDASCD for use in carrying out the soil conservation program of the soil conservation districts of the State.

The SCS PMC operations are conducted through an agreement between the NDASCD and SCS on about 60 acres of Lincoln-Oakes Nursery land in Bismarck. The Lincoln-Oakes Nursery also furnishes a full-time district employee, field labor during the busy season, some equipment, irrigation water, and miscellaneous materials. SCS reimburses the NDASCD for the above each month according to an annual financial supplement to the agreement between the two parties.

The association still operates the Oakes Nursery for the production of grasses. Later purchases of additional land have increased its size to the present 180 acres.

The PMC employs a manager, a full-time conservationist, and part-time stenographer. Also, associated with the PMC is a plant materials specialist who serves Minnesota, South Dakota, and North Dakota, the same States served by the PMC.

Acceleration of the plant materials program on mine spoil reclamation, as well as expanded field trials throughout the three States, was made possible by the allocation of additional funds from USDA's Forest Service Surface Environment and Mining (SEAM) program and the U.S. Environmental Protection Agency. Because of these additional funds, the PMC was also enabled to upgrade its equipment.

Lee Hinds, Lincoln-Oakes Nursery manager, said, "The association has long been a staunch advocate of improved plant materials and feels that the cooperation of the association and SCS through the mutual effort at the Bismarck Plant Materials Center is a necessary and productive relationship to meet the goals of good conservation on the land."

Ms. Johnson is information assistant,
SCS, Bismarck, N. Dak.

Conservation Plants on Display

by Michael McCrary

The Crider Memorial Garden of Conservation Plants in Beltsville, Md., displays more than 80 varieties of conservation plants. These plants represent the many grasses, legumes, forbs, shrubs, and trees selected by Soil Conservation Service plant materials centers for use in conservation and environmental improvement programs. They are all currently in commercial production and extensively used throughout the country. The 2-acre garden is part of the SCS National Plant Materials Center (PMC) in Beltsville.

The garden was dedicated in 1967 to Franklin J. Crider, an SCS plant materials specialist who, in the 1930's, devised the procedure that is still used today for testing and evaluating soil-conserving plants. Using the procedure, SCS PMC's and cooperating agencies have developed more than 200 improved varieties of plants which are extensively used throughout the country to help solve high priority soil and water conservation problems.

The garden is open to visitors year round. A pamphlet prepared by the National PMC contains a chart of the plantings and describes each plant and tree on display in detail. The pamphlet tells where each plant is best adapted, how it is used, and whether or not it is native to the area of use or an introduced species.

The conservation plants at the garden are grouped into warm season grasses, warm season legumes and forbs, cool season grasses, and cool season legumes and forbs. Releases of improved woody plants are displayed around the perimeter of the garden which was designed to be expanded to include new releases as they become available. As a plant is released to

commercial growers, the PMC releasing it sends seed or starter plants to the Crider garden.

To prevent erosion and provide easy access to visitors, the entire garden was planted to Kentucky 31 fescue to provide year-round grass cover. Ten-foot-long rows of the sod are removed for the conservation plantings as needed.

In 1978, 17 new varieties of conservation plants were released by SCS

in cooperation with other agencies.

These and other improved plant materials developed cooperatively by SCS and provided to commercial producers amounted to an estimated 13 million pounds of seed, 9 million woody plant seedlings, and 40 million plants, clones, or sprigs. This equals the amount of seed and plants it takes to treat 1.7 million acres of land.

Effective use of conservation plant materials reduces erosion and sedimen-



More than 80 varieties of conservation plants, currently produced commercially and used extensively, are permanently displayed in the Crider Memorial Garden of Conservation Plants in Beltsville, Md. The plants were developed by SCS and cooperating agencies.

'Cardan'—A Break for Windbreaks

tation, increases production, and improves the environment. Conservation plants are being used throughout the country to stabilize sand dunes, to protect streambanks and shorelines, to plant windbreaks and shelterbelts, to reclaim mined land, to protect and improve pasture and rangeland, and to provide wildlife food and cover.

At Crider garden, visitors can see conservation plants from the Northeast—'Cardinal' autumn olive; from the South—'Pensacola' bahiagrass; from the Midwest—'Blackwell' switchgrass and 'Kaw' big bluestem; from the West—'Rosana' western wheatgrass and 'Wytana' fourwing saltbush; and from the Southwest—'Corto' Australian saltbush. These and many other hard-working plants on display at Crider garden represent the results of more than 40 years of plant materials work.

Mr. McCrary is manager, National Plant Materials Center, SCS, Beltsville, Md.

The U.S. Department of Agriculture's Soil Conservation Service (SCS) and Science and Education Administration (SEA) announce the naming and release of 'Cardan' green ash.

Green ash is a deciduous hardwood tree which occurs naturally in the northern Great Plains and grows along streams and woody draws. The Cardan selection is recommended for use in farmstead and field windbreaks, wildlife habitat, and natural area plantings to restore surface-mined lands.

This selection had been tested as Mandan-12002 at the SEA-AR Northern Great Plains Research Center, Mandan, N. Dak. The variety was propagated in 1954 from seed collected by the late Dr. Ernie George, of the research center, from a farmstead windbreak in Wibaux County, Mont.

Cardan has been planted extensively by SCS in farmstead and field windbreaks in North Dakota, South Dakota, and western Minnesota, with limited plantings in adjacent States and SCS plant materials centers.

Results of the SCS plantings show that Cardan green ash is well suited to the northern Great Plains. It performs well with excellent survival and growth rates on a wide range of soils and climatic conditions typical of the Plains. The tree is medium size and may grow to 50 feet.

The Northern Great Plains Research Center will maintain breeder seed and foundation stock. The selected class of certified seed is available through the USDA SCS Plant Materials Center, P.O. Box 1458, Bismarck, N. Dak. 58501.



'Covar' Means More Cover

by Jack Carlson
and Clarence Kelley

Conservation-minded land users of the Pacific Northwest have a new groundcover available for reducing erosion, controlling weeds, and landscaping in low-rainfall zones. It is multiple-purpose 'Covar' sheep fescue, *Fescue ovina* var. *ovina* L.

Covar, released for commercial seed production in late 1977, was developed by the Soil Conservation Service Pullman Plant Materials Center (PMC) in cooperation with the Idaho, Oregon, and Washington Agricultural Experiment Stations.

An excellent erosion control plant, Covar is a tremendous root producer in the arid regions where it is adapted. Tests in eastern Oregon and Washington show Covar to be excellent for roadside seedings. A fine-leaf fescue with a slight bluish cast, it is very pleasing to the eye. These attributes, combined with its durability, also make Covar a desirable dryland turf for homes, campsites, playgrounds, airports, and other landscaped areas.

This newly introduced variety is recommended also for increasing species diversity, controlling erosion, and reducing weeds in range improvement efforts. Adapted throughout the range of Idaho fescue, Covar has proved an adequate substitute for this unavailable, low-seed-producing native fescue.

Although slow starting, Covar will crowd out rangeland weeds such as cheatgrass and medusahead rye. It may also dominate companion bunchgrasses and should be seeded only when erosion and weed control are primary concerns. It does not produce as much as the wheatgrasses or other commonly used dryland forages.

Covar is similar to the widely used 'Durar' hard fescue (also released by

the Pullman PMC), only much more drought tolerant. It is adapted down to 10 inches precipitation on medium-textured soils. Normally planted in early spring, Covar may take 3 years to develop a complete stand. It should be seeded with a rapid-developing bunchgrass such as crested wheatgrass.

Seeding Covar alone requires adequate mulching and is not recommended for steep slopes without careful management.

The tough chewings, creeping red, and hard fescues have been widely used for conservation groundcover in the Northwest for many years. Now another—Covar sheep fescue—is available for low-rainfall areas.

Mr. Carlson is plant materials specialist, SCS, Spokane, Wash.

Mr. Kelley is manager, Pullman Plant Materials Center, SCS, Pullman, Wash.

'Covar' sheep fescue is a durable erosion control plant. It is drought tolerant and has been used successfully in roadside seedings in eastern Oregon and Washington.



A Bonanza for Wildlife

by Jimmy Henry



'Elsberry' autumn olive, in addition to being a valuable wildlife shrub, is used for landscaping, screens and barriers, ornamental plantings, and field and farmstead windbreaks.

The search for outstanding varieties of woody plants for wildlife food and cover has led to the release of 'Elsberry' autumn olive, *Elaeagnus umbellata*. Elsberry was the result of many years of testing by the Soil Conservation Service plant materials center at Elsberry, Mo.

Autumn olive is not a native plant of the United States. It was introduced into this country about 1830 from China or Japan. The plants which were later released as Elsberry were obtained by SCS for evaluation in 1962 from the Forrest Keeling Nursery in Elsberry. The plant materials center initiated further selection among these plants in search of such characteristics as large, uniform fruits, abundant fruit production, and low branching.

Elsberry autumn olive is an open-growing, much-branching shrub, which reaches an approximate height of 19 feet (about 6 meters) and spread of 22 feet (about 7 meters). It begins to leaf out in early April and its leaves are silvery green. The main trunk and large branches are dark brown; the smaller branches and twigs are yellowish brown and spiny.

The yellow, sweet-scented flowers, appearing in mid-April, provide beautiful scenery to any area. The fruits of Elsberry are red and slightly larger than those of the 'Cardinal' autumn olive. They usually ripen in September and remain on the shrub until late winter. This characteristic makes Elsberry autumn olive a valuable wildlife shrub.

The fleshy, sweet-tasting fruits of Elsberry are favored by songbirds, raccoons, skunks, opossums, quail, ruffed grouse, mourning doves, pheasants, wild turkeys, and a host of other animals.

This species grows well on deep,

sandy, loamy, and moderately fine-textured soils that are moderate to well drained. It does less well on very dry soil and usually fails on shallow, poorly drained, or excessively wet soils. Elsberry appears to thrive equally well on soils ranging from moderately acid to moderately alkaline. Plantings have performed extremely well on acid mine spoils with a pH of 4.0 and above. The plant is tolerant of light shade but has fewer berries when grown in shade. Competition from grass, weeds, or other shrubs slows the young plant, but it overcomes such competition well.

Under favorable conditions, Elsberry autumn olive grows rapidly and produces berries by its third to fifth year. By then the plant is usually 4 to 8 feet (1 to 3 meters) tall.

Many successful field evaluation plantings of Elsberry have been made in plant hardiness zones 5, 6, and 7 to determine its area of adaptation. These zones represent southern Iowa, Illinois, Missouri, Kansas, and central and southeastern Nebraska. In plant hardiness zone 4, the northern part of the above States, Elsberry requires planting on the leeward side of a windbreak to prevent freeze-back injury.

Elsberry has been released as an open-pollinated, seed-propagated cultivar. Propagation by commercial nurseries will be from open-pollinated seed. Elsberry will be commercially available in 3 to 5 years.

Breeder seed is being maintained by the USDA SCS Plant Materials Center, P.O. Box 108, Elsberry, Mo. 63343.

Mr. Henry is manager, Elsberry Plant Materials Center, SCS, Elsberry, Mo.

Contour Orchards Pay

by Frederick E. Bubb

"If it hadn't been for soil and water conservation practices increasing yields, we probably wouldn't make it through the present farm price squeeze," said Rudy Mohr of Mohr Orchards in Lehigh County, Pa. Mohr credits conservation practices with increasing his fruit yields 20 to 30 percent. "That 20 to 30 percent makes the difference between profit and loss for us," he added.

Mohr is not a latecomer to conservation. Actually, he was a conservation pioneer in Lehigh County. He was a member of the first board of directors of the Lehigh Conservation District, a position he held for 8 years. He was also the first orchardist in the county to begin using soil and water conservation practices.

Mohr manages the 1,500-acre apple and peach orchard with his partner, Charles Snelling. When the trees in a valley on Washington silt loam with a silty clay subsoil did not produce the best fruit, Mohr and Snelling began

planting on the lighter, shaly soil on upland slopes. The trees needed the well-drained soil to produce quality fruit.

But protecting the soil from erosion and retaining moisture were especially critical on the sloping land. So Mohr and Snelling went to the Soil Conservation Service for help.

SCS Soil Conservation Technician Sam Yohn designed a diversion system for the sloping land. Now, 1,200 acres of the Mohr Orchards are planted on the contour with diversions every 300 to 400 feet down the slope. The diversions control erosion, retain moisture, and protect soil productivity. This is what makes the difference in fruit production.

Mohr said he felt that the water that used to run off his farm in heavy rains could be better used to improve his fruit crop. He pointed with pride to a 25-acre field and said, "Yesterday that field was just a hayfield, but today it is contoured and planted to apple trees. That type of efficient operation requires good, cooperative assistance. Sam Yohn from

SCS is here when I need him, and he has the answers to my questions."

Mohr's orchards are planted above a 600-foot elevation to avoid pockets prone to frost damage. The 1,500 acres of orchards stretch for 20 miles across Lehigh County. "By having our operation scattered, a severe hail storm or other isolated natural disaster will not ruin our total fruit crop," said Mohr.

"We'll still have some good fruit to sell." Mohr knows what he's talking about when he talks about fruit growing. Fruit from his orchards has won many top awards at the Allentown Fair and at the Pennsylvania Farm Show. Photos of presidents and governors eating Mohr's fruit adorn the walls of his roadside markets.

Because he practices what he believes, Mohr wants to share his knowledge of conservation with others. Occasionally, he asks SCS to present a program to other county fruit growers. After each session, many of the farmers attending also install soil and water



After Harold Schantz saw how terraces and contouring worked on Mohr's orchards, he became convinced that conservation measures would work in his orchards.

conservation practices on their land.

One of these farmers was Harold Schantz, of Schantz' Orchard in Orefield. Schantz is the third generation of his family to be in the orchard business.

"I'm a firm believer in conservation now," said Schantz, "but I was hard to convince in the beginning. SCS, through the conservation district, had helped my dad lay out some contour orchards a while ago, but it was Mohr who really convinced me of the need for both terraces and contouring when I saw them working on his farm."

The Schantz family has 200 acres of their 258-acre farm in orchards. Like the managers of Mohr Orchards, they discovered that trees on a low-lying area of Washington silt loam were not yielding quality fruit. So Schantz also began planting more trees on the well-drained, shaly soil on the uplands. He went to SCS for help in designing diversions to retain soil moisture and control erosion. Almost all the trees

planted in the last 15 years in Schantz' orchard have been planted on the contour.

In the late 1960's, the Schantz family built two ponds but neither would hold water. They asked SCS for help. "Sam Yohn showed us how to rebuild the ponds," said Schantz, "and they have both held. We use them for spray irrigation water and for fire protection." When asked about the economic benefits of conservation on the orchard, Schantz replied, "It's hard to say in dollars and cents. But we are saving soil and water. We know we are because we don't have to keep cleaning silt out of the ponds which collect runoff from the farmland." Controlling erosion also prevents soil damage that can reduce yields.

Another view on conservation farming came from Ed Koch, Mohr Orchards' general manager. "We are saving water," he said. "Even in the heavy hurricane rains of the past decade, several of our watersheds did not have

any runoff discharge at the outlet end. We were able to hold it all with contouring, terraces, and ponds. Also, with fuel prices going up, farming on the level becomes even more appealing because it saves fuel and energy."

"Because of high fuel costs," said Mohr, "we've had to stop using our big gun irrigation system. This means that getting all the rainfall into the ground is a must." Mohr and Schantz are each using about 30 acres of trickle irrigation, but most of the fruit crop must be supplied with moisture by rainfall.

Both Mohr and Schantz know the interdependence between natural resources and productive fruit trees. The conservation measures on their orchards protect the fertile, moist soil their trees need to produce high quality fruit.

Mr. Bubbs is public information officer, SCS, Harrisburg, Pa.

SCS Conservation Technician Sam Yohn helped Rudy Mohr lay out contour lines for planting orchard trees. This field was a hay field in the morning and by nightfall was transformed into an orchard.



New Publications

Environmental Education in Action IV

by the Soil Conservation Service

This publication is a collection of nine articles on environmental education reprinted from *Soil Conservation* magazine. It is the fourth in a series of environmental reprints.

The articles describe conservation education activities for elementary school, junior and senior high school, and college students and for teachers.

The articles discuss nature study areas that were developed by dedicated conservationists to provide outdoor learning experiences for youth; environmental education activities for youth who live in urban areas; a week-long education camp for junior high students; and an unusual learning tool, an 8-foot "earthworm" named Wee Willie Worm who teaches children about the environment.

One article gives results of a study on how many teachers actually go back to their schools and implement an environmental education program after in-service training.

Another article tells about a high school chemistry class and its experiences in monitoring water quality in a Pennsylvania creek. SCS was able to work with the students in using the data they collected in evaluating alternative solutions for flood prevention in the watershed.

Single copies are available from local conservation district offices or from the Information Division, Soil Conservation Service, Room 0054-S, Washington, D.C. 20013.

Reclamation Now: Protecting the Land and the Future

by the Soil Conservation Service

This booklet contains reprints of articles from *Soil Conservation* magazine. It includes a message from former SCS Administrator Mel Davis about the Surface Mining Control and Reclamation Act of 1977 and what it means to SCS, States, mine operators, conservation districts, and landowners.

Remarks by Dave Unger, then USDA deputy assistant secretary for Conservation, Research, and Education, at the "Get Smart on Coal" Symposium are included in the reprint. Mr. Unger discusses USDA activities in research on reclamation and making research results available to those who can use them, technical assistance available especially from SCS under the Rural Abandoned Mine Program (RAMP), and USDA help in setting policies and standards and working with States.

Also in the reprint are articles on: progress made by Wyoming and Montana coal companies in reclamation, Pennsylvania participation in RAMP, a Pennsylvania farmer who farms on reclaimed strip-mined land, and reclamation after sand and gravel mining in New York.

Single copies of the 24-page reprint are available from local conservation district offices or from the Information Division, Soil Conservation Service, Room 0054-S, Washington, D.C. 20013.

Outdoor Opportunities in Forestry, Wildlife Management, and Fisheries Management

by Employment Research Associates

This 52-page booklet examines the many job opportunities in forestry, the forest products industry, wildlife management, and fisheries management. Specific job classifications are listed, along with the qualifications and educational requirements, usual duties, and field prospects associated with the jobs.

The information would be useful to people interested in working for the Soil Conservation Service and related agencies, especially the descriptions of jobs such as forester, range scientist, soil conservation aide or technician, soil conservationist, soil scientist, and wildlife biologist.

The appendix contains lists of courses of study related to the fields addressed in the main section of the booklet with notations as to degrees awarded. Following is a cross list of colleges and universities with locations cited in the preceding course listings.

The appendix also includes employment prospects broken down into government agencies and industrial employers. Sources of career information are given in the section "Books, Pamphlets, and References," as well as under "Professional and Trade Associations."

Copies of the booklet are available for \$5.95 plus \$1 postage and handling from Employment Research Associates, P.O. Box 1025, Albany, N.Y. 12201.

Conservation Highlights 1979

Summary of Activities of the Soil Conservation Service for Fiscal Year 1979

In fiscal year 1979, employees of the Soil Conservation Service (SCS) of the U. S. Department of Agriculture (USDA) provided technical assistance to individuals, groups, and State and local units of government in applying soil and water conservation practices.

Through ongoing and special programs, SCS employees helped the Nation's landowners and managers make the most of available natural resources while protecting these resources from irreparable damage by erosion and sedimentation.

SCS continued to cooperate with other USDA agencies in meeting the requirements of the Soil and Water Resources Conservation Act of 1977. The act directs the Secretary of Agriculture to conduct a continuing appraisal of the status and condition of the Nation's non-Federal soil, water, and related resources and develop a comprehensive 5-year soil and water conservation program.

Because of a change in the agency's automated progress reporting system, data on individual conservation practices, such as acres of stripcropping or miles of terraces installed, are not reported here.

Conservation Help for Units of Government

SCS employees furnished more than 113,000 services to 29,356 local and State governments during the year. SCS provided basic soil and water data used by local governments in preparing regulations on land use and control of sediment and erosion.

Resource Inventories

In March, SCS released the first of three phases of the comprehensive National Resource Inventories. Phase I included data on sheet and rill and wind erosion, land use, and prime farmlands.

Soil Surveys

In fiscal year 1979, a record 133 soil survey reports were published and an additional 112 survey manuscripts with maps were sent to be printed. More than 67 million acres were mapped during the year.

In September, SCS established an international soils program under which a permanent national staff will provide technical assistance in soil management to tropical and subtropical countries. The program is funded by the Agency for International Development.

Snow Surveys

SCS snow surveyors in the West took an estimated 100,000 measurements of snow and other precipitation, temperature, and soil moisture during the year and issued 3,619 water supply forecasts. More than 200 automated data sites were in operation by the end of the year.

Conservation Tillage

Various forms of conservation tillage, including no-till, were used by U.S. farmers on about 55 million acres of cropland in 1979, compared to about 4 million acres 15 years ago. SCS gives technical assistance to farmers using these modern tillage practices which save fuel and soil.

Plant Materials

SCS plant materials centers released 14 new conservation grasses, legumes, wildflowers, shrubs, and trees to commercial seed growers and nurserymen in fiscal year 1979. The plants will be used to stabilize critical areas, reclaim surface mined lands, control wind erosion, improve range and pasture and wildlife habitat, and prevent nonpoint source water pollution.

Woodlands

SCS assisted landowners in applying woodland improvement practices on 1,159,730 acres of private woodlands. Practices included tree planting, direct seeding, improved harvesting, and site preparation.

Range and Native Pasture

SCS assisted with water developments in much of the range country, especially those areas afflicted by drought. Grazing management systems were the most widely applied practices to improve rangeland. The use of prescribed burning increased as an alternative to the use of herbicides and mechanical treatment for brush management.

During fiscal year 1979, nearly 25 million acres of rangeland and native pasture were adequately protected from erosion.

Recreation

SCS continued to provide technical and financial assistance for establishing or expanding public recreation developments during the year. SCS also assisted private landowners in developing commercial and noncommercial recreation facilities.

Fish and Wildlife

SCS strengthened its policies and procedures to safeguard the quantity and quality of fish and wildlife habitat. As a result, rules and regulations for wetland protection were issued; habitat evaluation procedures were tested; channel modification guidelines were used and evaluated; and mitigation for unavoidable damage was increased.

Soil Moisture Monitoring

SCS began a 5-year monitoring project during the year to obtain information needed to predict soil moisture for large areas in the conterminous 48 States. Data will eventually be collected at 10 locations. The information will be used in making drought and crop yield estimates.

Small Watershed Projects

During fiscal year 1979, 24 small watershed projects were completed, bringing to 498 the number completed since the program began in 1954. These Public Law 566 projects combine conservation measures and structural and non-structural measures to reduce flood damage and provide agricultural water management, municipal and industrial water, recreation, and wildlife habitat.

Emergency Assistance

Under Section 216 of the Flood Control Act of 1950, SCS obligated an estimated \$72 million in watershed emergency assistance to help States repair damage caused by floods and other natural disasters. SCS also published proposed new rules for repairing watersheds damaged by natural disasters.

Flood Plain Management

SCS completed 30 flood plain management studies in 18 States during fiscal year 1979, under Section 6 of Public Law 83-566. These studies include data on natural and beneficial values served by flood plains. Local units of government use this information to develop, amend, adopt, and implement flood plain management programs.

Colorado River Basin Salinity Control Program

Under Public Law 93-320, SCS is cooperating with the Water and Power Resources Service of the U.S. Department of the Interior to reduce salt loadings to the Colorado River, primarily through improved onfarm irrigation water manage-

ment measures. Under Title I of the act, SCS provides technical and cost-share assistance to irrigators in the Wellton-Mohawk project in Arizona. Structural practices have been installed on 78 farms, involving 11,668 acres, to date.

Under Title II, SCS conducts studies to determine the irrigation improvement measures needed to reduce salt loadings from designated Upper Basin irrigated salt-source areas. USDA cost assistance for the installation of salinity control practices on the first completed Title II study area—in Grand Valley, Colo.—began in fiscal year 1979. SCS provided technical assistance for completing 200 irrigation water management plans and for designing and installing needed practices on 174 farms. The practices include land leveling, water control structures, sprinkler systems, ditch lining, onfarm pipelines, and off-farm lateral lining and pipelines serving two or more farms.

River Basin Studies

SCS has USDA leadership for water and related land resource planning assistance to Federal, State, and local governments. SCS also leads USDA participation in Water Resources Council interagency studies. During the year, river basin planning studies were in progress in more than 40 States and 14 studies were completed.

Environmental Services

In addition to preparing its own environmental impact statements, SCS commented on 495 environmental impact statements prepared by other agencies and cooperated in numerous environmental assessments throughout the Nation. Final rules and regulations for compliance with the National Environmental Policy Act (NEPA) were published in the Federal Register on August 8, 1979. These regulations set SCS policy for integrating environmental values into all planning.

Soil Survey Investigations

SCS began a 4-year study, under an interagency agreement with the U.S. Food and Drug Administration and the U.S. Environmental Protection Agency, to determine background levels of cadmium and lead in 19 food crops and the soils in which they grow. The study is designed to determine maximum allowable limits of these metals in food and crops and in soils that will receive sludge. SCS collected soil and plant samples for analysis at 500 sites in 1979.

Important Farmland Inventory

As authorized by Section 302 of the Rural Development Act of 1972, SCS has the leadership role in USDA for inventorying the Nation's prime agricultural areas. At the end of fiscal year 1979, SCS had completed 262 county maps that delineate prime and unique farmland and farmland of State and local importance and 8 State maps that delineate only prime farmland.

National Agricultural Lands Study

The National Agricultural Lands Study (NALS), to investigate the extent, causes, and impact of agricultural land losses, began in June. The 18-month study is being carried out by an interagency group cochaired by the Secretary of Agriculture and the Chairperson of the President's Council on Environmental Quality. Four SCS staff members have been detailed to work full time on the NALS staff.

Water Quality Management Planning

By the end of fiscal year 1979, most States had submitted water quality plans to the governor for concurrence and to the U.S. Environmental Protection Agency for approval as required by Section 208 of the Clean Water Act. SCS and local conservation districts helped review and develop the areawide water quality plans.

Rural Clean Water Program

SCS and the Environmental Protection Agency, assisted by other USDA agencies, conducted eight workshops and developed a manual for implementing a rural clean water program (RCWP), authorized by Section 35 of the Clean Water Act of 1977. The 1980 Agricultural Appropriation Act included \$50 million in USDA's Agricultural Stabilization and Conservation Service budget for an experimental RCWP. The funds are to be used in projects selected primarily from the 64 RCWP applications already submitted by governors in 31 States. SCS is helping develop rules for the 1980 RCWP.

Great Plains Conservation Program

In the 10 Great Plains States, 1,043 farmers and ranchers signed long-term contracts to apply permanent conservation measures on 3.1 million acres. Through the Great Plains Conservation Program, SCS provides technical assistance and cost sharing to landowners to minimize the hazards of recurring drought and wind erosion.

Resources Conservation Act

SCS continued to work toward meeting the mandates of the Soil and Water Resources Conservation Act of 1977 (RCA). In appraising the Nation's soil, water, and related resources, SCS employees on USDA interagency task forces and work groups worked on four RCA draft documents for public review and comment. The documents will be used in developing a national soil and water conservation program.

The first of the four documents, Appraisal 1980, Review Draft, Part I, was published in September. It includes information on the quantity and quality of the Nation's resources and presents a view of current land conditions.

Agricultural Conservation Program

SCS provided technical assistance to farmers and ranchers participating in the Agricultural Conservation Program (ACP) administered by the Agricultural Stabilization and Conservation Service. ACP emphasized the installation of enduring conservation practices and solving environmental problems on privately owned agricultural land.

Rural Abandoned Mine Program

In June, the first contract was awarded under the Rural Abandoned Mine Program (RAMP), established by the Surface Mining Control and Reclamation Act of 1977. During the fiscal year, landowners signed 63 contracts under the program.

Resource Conservation and Development Areas

During fiscal year 1979, work continued in the areas authorized for assistance under the Resource Conservation and Development (RC&D) program and six new areas were authorized for assistance. Objectives of the program, which is under SCS leadership, are to improve the condition and use of the areas' natural resources, the environment, and the economic, cultural, and recreational opportunities for residents.

Summary of Progress Fiscal Year 1979

Reportable progress in soil
and water conservation
programs assisted by the
Soil Conservation Service.

Metric Conversion

To assist readers, information in the
tables is given in metric and in units
of common measure. A hectare is equal
to 2.471 acres.

Progress Item		Fiscal Year 1979	Cumulative to Sept. 30, 1979
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Conservation Plans and Related Services

District cooperators	No.	122,794	2,267,579
	acres	24,982,572	780,079,201
	hectares	10,110,122	315,687,912
Services to land users	No.	2,313,869	—
Individuals and groups assisted	No.	930,446	—
Individuals and groups applying practices	No.	436,951	—
Conservation plans	acres	19,073,872	608,663,699
	hectares	7,718,948	246,318,286
Conservation plans revised	acres	15,202,593	—
	hectares	6,152,291	—
Federal land units in coordinated conservation plans	No.	20	1,357
Federal lands in coordinated conservation plans	acres	219,035	15,429,189
	hectares	89,298	6,243,992

Conservation Help for Units of Government

Technical services for area planning	No.	113,038	—
Land use and treatment site plan reviews	No.	25,501	—
Agencies assisted	No.	29,356	—
Resource plans	No.	1,004	—

Snow Surveys and Water Supply Forecasting

Snow survey and water supply forecasts	No.	3,619	—
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Resource Studies

Resource studies	No.	2,992	8,473
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Soil Surveys

Soil surveys	acres	67,118,672	1,481,565,873
	hectares	27,162,054	574,075,167

Great Plains Conservation Program

Contract applications received	No.	1,471	61,818
	acres	3,082,524	121,337,181
	hectares	1,247,457	49,103,580
Contracts signed	No.	1,043	57,066
	acres	3,090,316	107,757,928
	hectares	1,250,611	43,608,233
Contracts terminated	No.	184	3,701
	acres	338,760	4,558,801
	hectares	137,082	1,844,888
Contracts completed	No.	2,144	41,118
	acres	3,994,388	73,582,264
	hectares	1,616,476	29,777,786
Unserviced applications on hand	No.	4,752	—

Progress Item		Fiscal Year 1979	Cumulative to Sept. 30, 1979
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Public Law 566 Watershed Projects

Applications	No.	13	2,625
Authorized for planning	No.	9	1,783
Approved for construction	No.	25	1,222
Construction starts	No.	8	974
Projects completed	No.	24	498

River Basin Studies

Initiated	No.	10	136
Completed	No.	14	83

Flood Plain Management Assistance

Flood plain management studies	No.	30	187
Flood insurance studies	No.	40	275

Colorado River Basin Salinity Control Program

Planning completed	No. of farms	236	333
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Rural Abandoned Mine Program

Contract applications received	No.	2,533	2,533
Contracts signed	No.	63	63
Unserviced applications on hand	No.	2,400	—

Resource Conservation and Development Areas

Applications on hand	No.	59	243
	acres	257,235,000	1,035,728,000
	hectares	104,100,000	419,146,000
Areas authorized for assistance	No.	6	184
	acres	22,468,000	778,493,000
	hectares	9,093,000	315,046,000
RC&D area plans accepted	No.	10	172
	acres	41,450,000	721,742,000
	hectares	16,774,000	292,080,000
RC&D measures completed	No.	1,474	15,434

Land Adequately Protected by Conservation Practices

Cropland	acres	10,655,173	
	hectares	4,316,057	
Pasture and hayland	acres	5,458,442	
	hectares	2,208,961	
Range and native pasture	acres	24,638,077	
	hectares	9,970,709	
Woodland	acres	2,298,638	
	hectares	930,229	
Wildlife land	acres	2,706,371	
	hectares	1,095,233	
Recreation land	acres	209,246	
	hectares	84,679	
Other land	acres	322,511	
	hectares	130,516	
Total Land Protected	acres	46,288,458	
	hectares	18,736,384	



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March 1980

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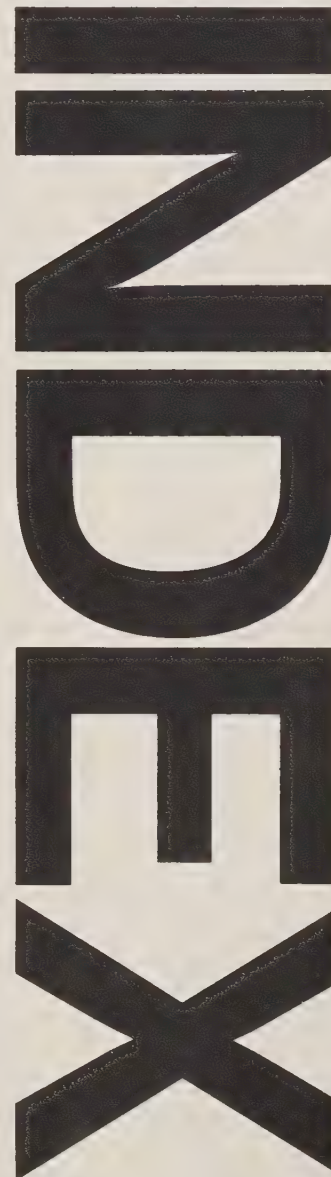
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Meetings:

March

- | | |
|-------|---|
| 5-8 | World Mariculture Society, Catfish Farmers of America, U.S. Trout Farmers Association, and the Fish Culture Section of the American Fisheries Society, New Orleans, La. |
| 9-14 | The American Society of Photogrammetry, St. Louis, Mo. |
| 16-18 | American Pulpwood Association, New Orleans, La. |
| 21-23 | National Wildlife Federation, Miami Beach, Fla. |
| 22-26 | North American Wildlife and Natural Resources, Miami Beach, Fla. |

April

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|-------|---|
| 2-4 | Annual Symposium on Engineering Geology and Soils Engineering, Boise, Idaho |
| 12-17 | American Planning Association, San Francisco, Calif. |
| 13-16 | Association of American Geographers, Louisville, Ky. |
| 13-17 | National Agricultural Plastics Association, Tucson, Ariz. |
| 15-17 | International Symposium on Livestock Wastes, Amarillo, Tex. |
| 16-18 | Hardwood Plywood Manufacturers Association, Charleston, S.C. |
| 27-29 | Chamber of Commerce of the United States, Washington, D.C. |
| 27-30 | The Garden Club of America, Norfolk, Va. |

May

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| 3-7 | League of Women Voters of the United States, Washington, D.C. |
| 11-14 | National Council of State Garden Clubs, Inc., Oklahoma City, Okla. |
| 21-23 | Southern Forestry Conference, Biloxi, Miss. |
| 22-27 | American Geophysical Union, Toronto, Ontario, Canada |
| 31-June 4 | General Federation of Women's Clubs, St. Louis, Mo. |
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Meetings:

March	
5-8	World Mariculture Society, Catfish Farmers of America, U.S. Trout Farmers Association, and the Fish Culture Section of the American Fisheries Society, New Orleans, La.
9-14	The American Society of Photogrammetry, St. Louis, Mo.
16-18	American Pulpwood Association, New Orleans, La.
21-23	National Wildlife Federation, Miami Beach, Fla.
22-26	North American Wildlife and Natural Resources, Miami Beach, Fla.
April	
2-4	Annual Symposium on Engineering Geology and Soils Engineering, Boise, Idaho
12-17	American Planning Association, San Francisco, Calif.
13-16	Association of American Geographers, Louisville, Ky.
13-17	National Agricultural Plastics Association, Tucson, Ariz.
15-17	International Symposium on Livestock Wastes, Amarillo, Tex.
16-18	Hardwood Plywood Manufacturers Association, Charleston, S.C.
27-29	Chamber of Commerce of the United States, Washington, D.C.
27-30	The Garden Club of America, Norfolk, Va.
May	
3-7	League of Women Voters of the United States, Washington, D.C.
11-14	National Council of State Garden Clubs, Inc., Oklahoma City, Okla.
21-23	Southern Forestry Conference, Biloxi, Miss.
22-27	American Geophysical Union, Toronto, Ontario, Canada
31-June 4	General Federation of Women's Clubs, St. Louis, Mo.



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August 1979

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Better Facts, Better Programs

From the Administrator

In designing local, State, and national conservation programs, the need has never been greater for reliable data about natural resource conditions and trends.

The National Resource Inventories (NRI) are providing a welcome first round of those data. Phase 1, now completed, already marks the most comprehensive resource information we have had since the 1967 conservation needs inventory. Phases 2 and 3 will be done by 1980.

We are grateful for the amount of time and care used by SCS field employees, with the support and cooperation of local conservation districts, in gathering information from more than 200,000 sample points since 1977.

The summaries of their effort give fresh insight on soil quality, land and water use, conservation needs, floodprone areas, wetlands, sheet and rill erosion and wind erosion, potential for new cropland, prime farmlands, and irrigation. They will be tremendously useful in the Resources Conservation Act appraisal and program process; in the legislative arena; and in current and long-range programming by conservation districts and State groups.

The data need to be used with as much care as they were collected. For example, the new national average for soil loss by sheet and rill erosion on all cropland is 4.8 tons an acre each year. Several writers have concluded that "Soil losses have been much less than previously reported," and some may infer that our soil erosion problems are over. Yet:

- Two billion tons of soil lost annually still is a critical problem that affects food and fiber production, water quality, energy use, and other parts of America's economy and environment.
- "Average" figures mask the serious soil-loss rates on critically eroding areas where our targeted conservation assistance is an urgent priority.
- "Average" figures also mask the much lower erosion rates that many land users have achieved through conservation tillage and other methods with our help. Their success cannot be a one-time thing; the practices or systems must be maintained and in some cases replaced to continue the protection.

The NRI will give a better idea of the challenges ahead. It is up to every SCS employee and every district official or manager to find and use other better ideas to go along with them.

Mel Davis

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Secretary of Agriculture

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Soil Conservation Service

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Cover:

A dairy herd grazes a pasture of pangolagrass in Ward Valenciano, Juncos, P.R. Grassland acreage is expanding to cover hillsides once scarred with erosion from sugarcane and row crops. See article beginning on page 10.
(Photo, Emérito Martínez-Ruiz.)

Taking Stock of Our Natural Resources



The National Resource Inventories include data on non-Federal land available for grazing. The inventories show that some 40 percent of rangeland is in good to excellent condition compared to only 20 percent in these categories 15 years ago.

Background

Results of Phase 1 of the National Resource Inventories (SCS-NRI) are now available. The Soil Conservation Service began the inventories in March 1977 in order to provide current resource data to:

- Respond to findings of the USDA Task Force on Adequacy of Conservation Systems on Cropland;
- Answer Senate Committee on Agriculture, Nutrition, and Forestry requests for information about program needs and progress;
- Meet recommendations of the task force on "Future Directions of SCS";
- Answer General Accounting Office questions related to an audit;
- Update 10-year-old estimates of conservation needs and soil erosion; and
- Aid in appraisal of resource conditions and trends that would be called for in a Soil and Water Resources Conservation Act (RCA), which was enacted in fall 1977.

The inventories were designed to provide statistical data for non-Federal lands in each State (except Alaska) in the United States and in the Caribbean Area. They used about one-third of the randomly selected sample areas that were used in the 1967 national inventory of soil and water conservation needs. Data were collected by SCS field employees at 70,000 primary sample units and more than 200,000 sample points.

Phase 1 of the SCS-NRI includes data on land capability classes (soil quality), land use and use of small water areas, conservation needs, floodprone areas, wetland types 3 to 20, sheet and rill erosion, wind erosion in the 10 Great Plains States, potential for new cropland, irrigation, and prime farmlands.

Phase 2 of the inventories will be completed later this year and will include data on gully, streambank, roadside, and construction-site erosion.

Phase 3, the last in this inventory cycle, will be completed in 1980. It will include using new data in a computer model to estimate sediment delivery for major river basins (hydrologic units).

SCS-NRI data will be used by SCS State offices for long-range soil and

water conservation programing and planning. These data and other current information also are being used in the first RCA appraisal and program now underway. Decisionmakers in other agencies as well as private firms, groups, and organizations that need current natural resource information will find the data useful for selecting resource-oriented research, activities, and evaluations.

These inventories will be updated on a continuing basis as the need arises for up-to-date information.

The Findings

Soil Quality

Rural land available for agricultural, forestry, and other uses declined by nearly 37 million acres in the 1967-77 period. Yet the percentage of good, fair, and poor land remained about the same. That is, 44 percent of the rural land (613 million acres) is in land capability Classes I-III, 13 percent is in Class IV (189 million acres), and 43 percent is in Classes V-VIII (599 million acres).

Soil Quality— Non-Federal Rural Land (Excluding Alaska).

Condition*	Million Acres	Percent
Level	414	29
Sloping	1,021	71
Wet	269	19
Droughty	402	29
Flood Prone	175	12

* Some soils are sloping but wet, level but droughty, etc.

Of the total rural non-Federal land, 414 million acres occur on level to nearly level topography and over 1 billion acres occur on gentle to very steep slopes. At least 269 million acres have a natural wetness condition, while nearly 402 million acres are droughty or lack sufficient water to grow agricultural or forestry crops. Some lands are sloping and wet, others may be level and droughty. Many of these conditions, singly or in combination, limit the use of land.

Land Use

Cropland: There is a continuing decline in the acreage of non-Federal land used for growing crops in the United States. During the 10-year period from 1967 to 1977, acres in cropland decreased by 18 million, from 431 million to 413 million. This represents a decrease of 1.8 million acres a year. The rate is considerably less than the decline of the 1950's, but about the same as the decline of the 1960's. The 1977 SCS-NRI data show that land users retained the better land for cropland. Since 1950, there has been a 3-percent increase in the use of good land (capability Classes I-III) for cropland and a 4-percent de-

crease in cropping of poor land. Use of fair (marginal) lands increased by 1 percent.

Grassland and forest land: Land available for grazing has increased greatly; it accounted for 541 million acres in 1977. Now, over half of the non-Federal agricultural land is used for native pasture, pastureland, and rangeland. The SCS-NRI data show an overall decline in non-Federal forest land. In 1967, there were 444 million acres of non-Federal forest land. The total decreased to 370 million acres in 1977, a change of 74 million acres.

Urban and built-up: The 1977 data confirmed previous estimates that homes, factories, roads, and other similar uses are absorbing rural land at a rapid pace. Some 90 million acres now are in these uses or committed to these uses. Another 4 million acres are in very small built-up areas and are considered part of the other rural land uses. Nearly 95 percent of the rural land shifted from agricultural, forestry, and other uses is related to urban development. The remaining 5 percent of land changed to small water areas. The data suggest that land is converted to these irreversible uses at a rate of about 3 million

acres a year. About 10 percent of the land converted to small water areas and 30 percent of the urban and built-up areas come from land formerly used for cropland.

Use of Small Water Areas

Small water areas increased by more than 1 million acres in the 1967-77 period. SCS-NRI data show that the total 9 million acres of small water is evenly divided between small streams (less than 1/8-mile wide) and water bodies (less than 40 acres). About 4 million acres of small water are used primarily for recreation, including fish and wildlife. Nearly 3 million acres are useful for livestock water supply.

Conservation Needs

Some 892 million acres of non-Federal agricultural and forest land needed conservation treatment in 1977. The total did not change significantly over the 10-year period, but the kind of treatment needed—and the kinds of land requiring treatment—did change distinctly. In 1967, 64 percent (272 million acres) of cropland needed treatment; 58 percent (241 million acres) required treatment in 1977, a decrease of 6 per-

Use of Prime Farmland in 1977.

Land Use	Acres (millions)	Percent
Cropland	231	67
Native Pasture and Pastureland	39	11
Rangeland	23	7
Forest Land	42	12
Other Land	11	3
Total	346	100

cent for cropland. Total acres in pastureland and rangeland increased, as did the treatment needs. In 1967, 71 percent (346 million acres) needed treatment; this increased to 75 percent (404 million acres) in 1977. Surprisingly, the percentage of forest land needing treatment increased from 62 percent to 67 percent in the 10-year period while the acreage of forest land decreased.

Floodprone Areas

SCS-NRI data specifically identified the acreage of floodprone areas and furnished valuable new information on the use and quality of this fragile resource. There are 175 million acres of flood-prone areas in the non-Federal land area of the United States (excluding Alaska). About 32 percent (54 million acres) is pastureland, native pasture, and rangeland. Another 30 percent (52 million acres) is forest land. Another 27 percent (48 million acres) is cropland. The remaining 11 percent is in other land uses. About 46 percent of the floodprone land is of good quality (capability Classes I-III) and 54 percent is fair to poor (Classes IV-VIII).

Prime Farmlands

The 1975 estimates showed 384 million acres of non-Federal prime farmlands in the United States and Caribbean Area; the 1977 SCS-NRI data showed 346 million acres. The latter figure is a more accurate measure of these important farmlands. Three States have more than 20 million acres each of prime farmland, four States have 15 to 20 million acres each, seven States have 10 to 15 million acres each, and nine States have 5 to 10 million acres each. Some 67 percent of the prime farmland already is being used for cropland. Only 116 million acres of prime farmland are in other uses. Of these, 1977 SCS-NRI data showed that only about 45 percent (52 million acres) could practicably be shifted to cropland production.

Sheet and Rill Erosion

Estimated average annual sheet and rill erosion for all cropland is 4.8 tons per acre. Cropland erosion rates range from less than 1 ton in some States to more than 41 tons per acre for the Caribbean Area. Estimates in 1967 showed annual cropland erosion rates of 5.9 tons per acre and a total of 2.6 billion

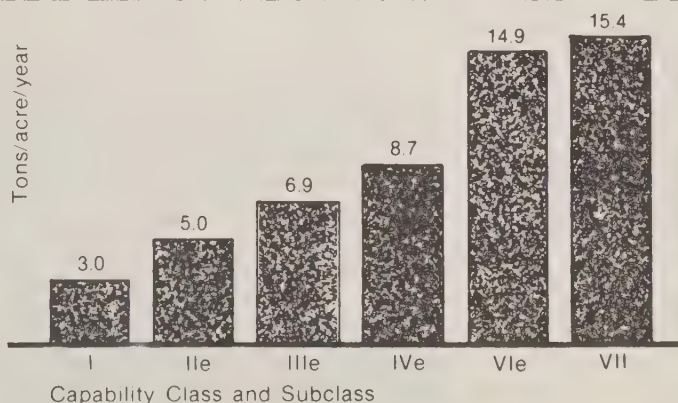
tons eroded. In 1977, the amount was down to 2 billion tons annually.

This bright picture is dimmed by the fact that 22 States, mainly in the central and eastern part of the United States and the Caribbean Area, have average annual erosion rates for cropland of 4 tons or more per acre. Seven States and the Caribbean Area have more than 8 tons. Sloping croplands are eroding at one to nearly four times their permissible rates. Some nearly level wet soils in the Delta region are eroding at above permissible rates. Non-Federal pastureland and native pasture in 11 States and the Caribbean Area have average annual erosion rates of more than 4 tons per acre. Non-Federal rangeland erosion rates in five States and the Caribbean Area are over 4 tons per acre. Except for three States and the Caribbean Area, erosion rates for non-Federal forest land are not high; but grazed forest land is eroding three times as much as nongrazed forest land.

Wind Erosion in the Great Plains

Average annual soil loss on cropland in the 10 Great Plains States from erosion by wind is 5.3 tons per acre. Annual rates for each State range from 1.3 tons

Estimated Average Annual Sheet and Rill Erosion on Cropland in the United States in 1977, by Capability Class.



per acre to 14.9 tons per acre. Three of the States have rates above 8 tons per acre. Annual erosion by wind on rangeland varies from none in two Great Plains States to 6.2 tons per acre for one State.

Potential for New Cropland

A 1975 SCS inventory that estimated how much non-Federal pastureland, rangeland, forest land, and land in other uses could be converted to cropland created much interest and debate. New data were collected for the 1977 SCS-NRI, based on 1976 prices and costs. Although this non-Federal rural land with high or medium potential for conversion to cropland was estimated at 135 million acres in 1977 compared to 111 million acres in 1975, the acreage with high potential was down by nearly 50 percent. The acreage of non-Federal land with medium potential for conversion was up to 95 million acres, suggesting that (1) conversion problems were thought to be more complex in 1977 than in 1975, or (2) prices received versus the cost to produce a crop were such that more land with conservation problems might be brought into production in 1977.

Irrigated Land

The acreage of irrigated land has increased sharply. In 1967, 47 million acres of cropland and pasture were irrigated; in 1977, the total was 62 million acres. Irrigation is no longer confined to the dry areas of the West—SCS-NRI data show that all but two States now irrigate some lands. Three States irrigate more than 5 million acres each and 14 States irrigate 1 to 5 million acres each. Most of the land (63 percent) is irrigated by use of gravity systems. Another 23 percent is irrigated by use of pressure systems. The remaining 14 percent uses a combination of both.

Wetlands

New data are available on the use, composition, and potential of wet soils and wetland types 3 to 20. Except for areas classified as open water, there are 42 million acres of non-Federal wetlands in the United States, of which 40 million acres (97 percent) are in noncropland uses. Forested wetlands account for 50 percent of the acreage. None of the wetlands has potential or is available for conversion to cropland. By contrast, the United States (except Alaska) has 269 million acres of wet soils on non-

Federal lands. Nearly 105 million of these acres are now cropped; of the other 164 million, only 31 million have potential for conversion to new cropland.

Conclusion

The 1977 data indicate that erosion rates for cropland are lower and the amounts less than predicted in earlier studies. Nevertheless, erosion by wind and water remains a serious problem. Erosion rates are above permissible levels for all sloping soils and are surprisingly high for some level or nearly level wet soils. Most attention needs to be given to the problem of erosion on these wet soils.

The rate of conversion of land to urban and built-up areas has increased significantly during the past 10 years. A large percentage of the land converted each year is high-quality cropland that has few or no inherent conservation problems and on which conservation measures have been applied to minimize erosion.

A swine herd grazes on irrigated pasture in North Carolina. The inventories indicate that irrigated acreage has increased sharply and is no longer confined to dry areas of the West.



It's a Natural

by Loren J. Pearson
and Lawrence Tedford

When herds of bison roamed the Great Plains, they grazed down an area, then quickly moved on to another. A north-west Kansas rancher, Don Smith, is taking a range management lesson from the bison's grazing pattern.

"The key to grazing management on native range," he explained, "is to have the cattle graze a pasture rapidly and uniformly—like we do wheat pasture—till the proper amount is removed, then move them into the next pasture.

"If a rancher does a good job of grazing wheat pasture, he can do a good job of rotation grazing on native rangeland."

Smith's rotation grazing system is made up of three pastures of unequal size and carrying capacity. Grazing begins in mid-May and continues in the first pasture until about July 1.

Then he moves his cattle into the second pasture and they stay until the grass is properly used, usually in mid-August. He winds up his grazing season in the third pasture. The next year this is the pasture that is grazed first in his rotation system.

Smith has found that a grazing system provides his operation with some added benefits. "We've never had to move our cattle because of lack of grass," he said. "The maturity of the grass governs when we move the cattle to the next pasture."

Smith is a cooperator with the Sherman County Conservation District. In 1972 he signed a Great Plains Conservation Program contract with the Soil Conservation Service for help with erosion control and range management. Under the contract, SCS assisted him with his grazing system.

Smith carries out his grazing system on 4,500 acres of native prairie, where

the vegetation is mostly blue grama and buffalograss on the upland sites and western wheatgrass on lowland terrace sites. Stands of big bluestem, sideoats grama, indiagrass, and switchgrass can be found along some stream channels.

Rainfall is the most limiting factor affecting grass production in the area. Average annual precipitation is about 17 inches, with about three-fourths of it falling between April 1 and October 1. Since variable weather makes it difficult to determine the proper stocking rate for any given season, Smith's system offers a big advantage because he can adjust cattle numbers from year to year, based on available grass.

He advises that for evaluating a total management program one should consider the effect on the grassland, the individual animal performance, and pounds per acre of beef produced. He started managing his present operation in 1969 by recording "in" and "out" weights on his steers. These weights are the data for animal performance and pounds of beef per-acre produced. Range condition and plant vigor help him predict the ability of his range unit to sustain grazing pressure. If a range unit is severely overgrazed, the effect will be reduced forage production the following year and poor animal performance while on grass.

Smith initiated a rotational grazing program during the 1975 grazing season. His average daily gains in 1975 were equal to the previous 5-year average under continuous grazing. "Our gains in 1976 averaged slightly over 2 pounds per day," he said. "This exceeded the continuous grazing average by nearly a pound per day. Our carrying capacity is definitely increasing on the

total unit. We were in a dry weather cycle in 1978, but the grass looked as good then as it ever had, and our gains were at least as good as in 1977.

"Rotation grazing will not solve every grazing management problem that confronts the rangeland manager, but it can help. Each system has to be designed on an individual basis.

"It takes a lot of discipline to manage a unit right," Smith concluded. "You need to realize that once a pasture has been grazed, it is best to let it grow for next year. The increased vigor of the plants next year will offset any extra grazing I get this year."

Under ranching conditions, Don Smith has shown that the rotation grazing approach is producing extra grass and extra pounds of beef.

In the fall of 1978 in recognition of his achievements, he received the award for Excellence in Grazing Management from the Kansas-Oklahoma section of the Society of Range Management.

Mr. Pearson is area range conservationist, SCS, Hays, Kans.

Mr. Tedford is district conservationist, SCS, Goodland, Kans.

Puerto Rico Reshapes Its Land Use for Improved Agricultural Production



Housing projects near Arecibo spread into land that once grew sugarcane. Valuable farmland in the northern section of Puerto Rico is going out of production due to urban land needs.

Limited food and fiber production versus increasing population is an economic problem that faces many people in many parts of the earth today. Puerto Rico is one of those places and Puerto Ricans are working on a solution based on better resource management.

Puerto Rico now imports 80 percent of its food and fiber needs, up considerably since 1950. Population for the island stands at about 3½ million and is expected to reach 5 million by the turn of the century. Cities and towns, expanding to house population growth, are taking acres of good cropland out of production.

Aiming to reverse this trend, Puerto Rico's Governor Carlos Romero-Barceló, with concurrence from President Carter, requested an indepth study of the problem. U.S. Secretary of Commerce Juanita Kreps and Miguel Rivera-Ríos, chairperson of Puerto Rico's Planning Board, coordinated this overall interagency study involving 12 Cabinet-level departments. The formal title of the study is "Puerto Rico Agriculture, Food, and Rural Living: Opportunities, Constraints, and Alternative Public Policies for the Future."

Puerto Ricans weren't facing starvation or unusually poor diets, according to the study. But the population, in general, did face a serious growing economic problem as more and more food was shipped into the island and less and less grown by local farmers.

As part of the study, the U.S. Department of Agriculture (USDA) was assigned a leading role in the analysis of the status of agriculture, food consumption, and rural living conditions. This included an assessment of programs—government and nongovernment—and an evaluation of alternative strategies

for improving these aspects of Puerto Rico's economy.

It also included the assessment of the Commonwealth's future food and fiber needs and its potential agricultural production capabilities. USDA's Soil Conservation Service (SCS), one of the 13 USDA agencies involved in the study, was involved in determining agricultural production capabilities.

Historically, Puerto Rico's major agricultural crops had been sugar, coffee, and tobacco. Numerous other crops were grown but largely for farm family use, not for marketing. Thirty to forty years ago, sugarcane plantings covered tremendous amounts of land. In fact, the increased sugarcane acreage created a serious erosion problem. When flatland acreage, where sugarcane normally was grown, was covered with cane, the cane was planted on steep hillsides. Because the hillside planting had little ground cover, soil washed down the hills into streams and reservoirs. This erosion, in turn, robbed the reservoirs of water storage capacity as sediment filled them. This meant irrigation water needed for crops and municipal water supplies was reduced.

During this same period, Puerto Rico's administration introduced a program called "Operation Bootstrap" aimed at building industry on the island. With new industries setting up operations, many islanders found better jobs in the cities leaving idle farms behind. While this change was taking place, sugar and tobacco markets were dwindling due to economic changes. This brought a gradual end to tobacco planting and a sizable reduction in sugarcane plantings on the steep slopes. This shift in agriculture did reduce the serious erosion problem that had

plagued the countryside. Unfortunately, the damage had already been done to the island's water storage reservoirs. In seven of the largest lakes, a total of 32,500 acre-feet—more than half of their total capacity—had been lost to sediment during the 40-year period.

During the same period, agriculture had dropped from being the island's leading business to its smallest. Today, 6 percent of the island's total work force is employed in agriculture-oriented jobs. Forty years ago, the figure was 36 percent.

Fortunately, the Puerto Rican administration hasn't given up on the island's agricultural problems. Local soil conservation districts (SCD's) are taking a more active role in coordinating the various natural resource development programs and the technical assistance from Federal and Commonwealth agencies. SCS technicians, working through local SCD's, are helping landowners and farmers plan resource protection measures designed to preserve productivity and reduce water runoff and erosion.

One of the big plusses today is the gradual expansion of grassland acreage. Many hillsides, once scarred with erosion from sugarcane and row crops, are now covered by lush green pastures, grazed by beef cattle or dairy herds. Grasses, recommended by SCS, have improved beef and dairy production. Springs and ponds have been developed with SCS designs to provide additional stock water for the cattle.

There is also a gradual trend toward more commercial farm operations replacing the older family subsistence operation. A more diversified agriculture base that includes increased production of tropical fruits, a variety of vege-

Steep hillsides in Ward Pitahaya, Luquillo, where sugarcane was once grown are now protected by pangola-grass pastures.



At left, Jose Rivera—a farmer in Ward Cedro Arriba, Naranjito—now uses a drip irrigation system where he once watered by hand.



At right, Lake Caonillas near Utuado is one of seven major reservoirs that have lost over half of their original capacity due to sedimentation from years of upland erosion.

tables, beef, pork, poultry, and dairy products is being encouraged. In a few instances, farmers are using new drip irrigation methods to grow orchards and tomatoes. These new methods conserve scarce water supplies and provide far greater yields of superior fruits and tomatoes on much smaller areas.

One interesting community farming experiment in south central Puerto Rico was started in 1975. This community cooperative venture is called El Melón, a 300-acre hill country area in Coamo. (See article beginning on page 14.)

Here the Puerto Rican administration purchased 300 acres of idle farmland and resold it to a group of 24 farmers who were selected as leading conservationists. These farmers will pay the government for their land at a very low interest rate over the next 20 years.

Each farmer has a conservation plan for his land, developed with technical assistance from SCS. The government provided plans and material for a home and a chickenhouse on each farm. The farmers have helped each other build these new structures. Plans now call for a second chickenhouse on each farm. In a few years, each farm will have three chickenhouses to raise broilers.

Good roads throughout the 300-acre area have been built by the government. Two deep wells and pumps plus hilltop holding tanks provide the new community with adequate water. Vegetables, fruit trees, and some beef cattle occupy acres not needed for the poultry activity. The hills are protected from erosion by thousands of feet of diversion hillside ditches and grassed waterways.

According to Enrique Ortiz-Torres, head of the Division of Planning in the Commonwealth's Department of Agri-

Antonio Colon, a farmer in Ward Padilla, Corozal, discusses his irrigation system for tomatoes with SCS Soil Conservationist Maria Montes.



culture, "El Melón is working very well. Several similar community projects are in the planning stage. Therefore, we have already purchased 60,000 acres of land in other municipalities which will be used according to their soil capabilities—the right use on the right land. To do this we will use information provided by the SCS Cooperative Soil Surveys."

Other future plans for improvement of agriculture production on the island, according to the study, call for an increase in woodlands from 66,000 to 220,000 acres. Rice could be produced on 25,000 acres of irrigable lands along the north coast of the island. Pineapple acreages could be increased 50 percent. Tropical fruits, such as mango and avocado, could be economically expanded over 5,000 acres with the use of drip irrigation in the arid southeast part of the island. Plantain yields could be doubled through effective spacing, fertilization, and harvesting.

An additional 240,000 acres could be brought into managed pastureland.

There are several alternatives in Puerto Rico's quest for improved food and fiber production. Which direction will be the best to follow is still to be decided. One thing is clear, however, Puerto Ricans don't plan to sit back and let the world provide all their growing food and fiber needs. They do plan to develop their natural resources, protect their attractive tropical landscape, and maintain a sound agricultural base designed to make the best possible use of their island's limited farmland. The study helped them understand their overall food and fiber problems and lay the groundwork for future resource protection projects.

Mr. García is soil conservationist, SCS, Hato Rey, P.R.

Community Resource Planning Takes to the Hills

by Sergio Reyes-Zamora

Otilio Reyes cleans out a hillside ditch on his farm at El Melón. He knows that regular maintenance is necessary to keep the ditches functional.



In the steep, rolling, picture-perfect hills of Coamo in south-central Puerto Rico, 24 farmers demonstrate that community action offers a profitable answer to modern farming. In a project known as "El Melón," these farmers on their 300-acre site have undertaken an experiment in modern resource planning and development.

The lack of water in the area is a problem. The semiarid climate yields annually about 30 inches of rain, most of it falling during the short rainy season from September to November. Therefore, farming in this area has to be oriented toward low-water-consuming operations.

Because Puerto Rico imports about 80 percent of its food, the Commonwealth Rural Development Corporation wanted a project that would boost food production. At the same time, the project had to keep water needs to a minimum while making good use of the natural resources.

One of the main reasons for selecting the municipality of Coamo, located in the northeast part of the Caribe Soil Conservation District (SCD), as the pilot area was the high unemployment rate.

The Rural Development Corporation asked USDA's Soil Conservation Service for assistance in selecting the specific site for the project in the Coamo area. In a series of meetings involving the Agricultural Extension Service, the Agricultural Experiment Station, Water Resources Authority, Sewer and Aqueducts Authority, municipal authorities, community leaders, and SCD supervisors, SCS District Conservationist Anastasio Morales presented detailed information about the area resources. It was agreed that a poultry enterprise should be the main source of income for the project participants and that cultivation of cash crops, vegetables, and fruit orchards should be secondary.

The Puerto Rican administration had purchased 300 acres of idle farmland in

Coamo and divided it into 24 farms. A committee including Morales screened more than 100 candidates to select owners for the farms. The candidates were selected primarily according to their knowledge of farming and their willingness to apply soil and water conservation measures to meet the government goal of production with protection of the resource base. Each selected candidate became the owner of a 7- to 40-acre farm, the size being governed by topography and soil limitations based on SCS soil information. The 24 farmers will pay the government for their land at a very low interest rate over the next 20 years.

The project was put into action in December 1975. A small pond located on the original farm was retained as a recreation facility for the community. The farmers and their families worked together to build their homes and the buildings for the poultry enterprise. The Commonwealth government provided

SCS Soil Conservationist Sergio Reyes-Zamora checks a diversion ditch in a hillside field of pigeon peas on one of the El Melón farms. Thousands of feet of these diversions have been constructed in an effort to reduce soil erosion.



materials and basic designs on a long-term loan basis.

At this stage in the planning and development process, SCS gave technical assistance to the 24 farmers as a group to develop a water system for the poultry enterprise and livestock and for small irrigation systems. Two deep wells supply the water for these purposes, each well furnishing about 75 gallons per minute. SCS technicians made studies and provided designs for the pumps to be installed, the storage tanks needed, and the pipelines to convey the water throughout the entire project. Two large water tanks in the project, with a combined storage capacity of 100,000 gallons, supply water for agricultural uses through pipelines to the 24 farms. Water for human consumption is provided separately by the Sewer and Aqueducts Authority.

In addition, three deep wells have been drilled by individual farmers on their farms. One farm, owned by

Hipólito Santiago, has a natural spring. "I am a lucky man," said Santiago, "because I have been able to plant about 2 acres of avocado and mango trees and irrigate them with water from the spring using a drip system designed by SCS."

Each farm now has a poultry barn that holds 10,000 chickens. Average production is 50,000 pounds per barn every 8 to 9 weeks. A second poultry barn is under construction on each farm and a third one is planned for 1980.

As to the secondary enterprises, many farmers are cultivating truck crops and vegetables such as tomato, eggplant, pumpkin, corn, pigeon peas, yucca (cassava), pepper, and yams. On other farms, which were kept in pastures, beef cattle and goats are raised.

Each farmer developed a conservation plan with SCS assistance. Many of them have implemented one or more practices. Main conservation measures are hillside ditches and contour farming. About 15 to 18,000 feet of hillside ditches have been established so far. As soon as the final site selection is made for the second and third poultry houses on each farm, more hillside ditches will be established.

According to Agronomist Enrique Ortiz-Torres of the Commonwealth Department of Agriculture, "El Melón is an attempt to use the land according to its capabilities. Because this project is doing well, other projects are now planned."

A similar project, known as "El Ucar," is underway in the Salinas area in the Sudeste SCD. A third project, producing fertile eggs for the poultry projects, is under study for development in Villalba, another town in the Caribe SCD.

The elected leader of the El Melón project, Otilio Reyes, proudly tells his own story to the many visitors that come to study the project from other parts of the island as well as from the mainland and foreign countries. Reyes recalls that during the great depression he worked on Coamo area farms for the Civilian Conservation Corps. He helped lay down rock and vegetative barriers, construct terraces and ditches, and worked on many other conservation practices.

He says, "I was so impressed with the benefits of those conservation practices that my only dream then was to buy a bit of land and put on it the practices that I had helped to establish on other peoples' farms."

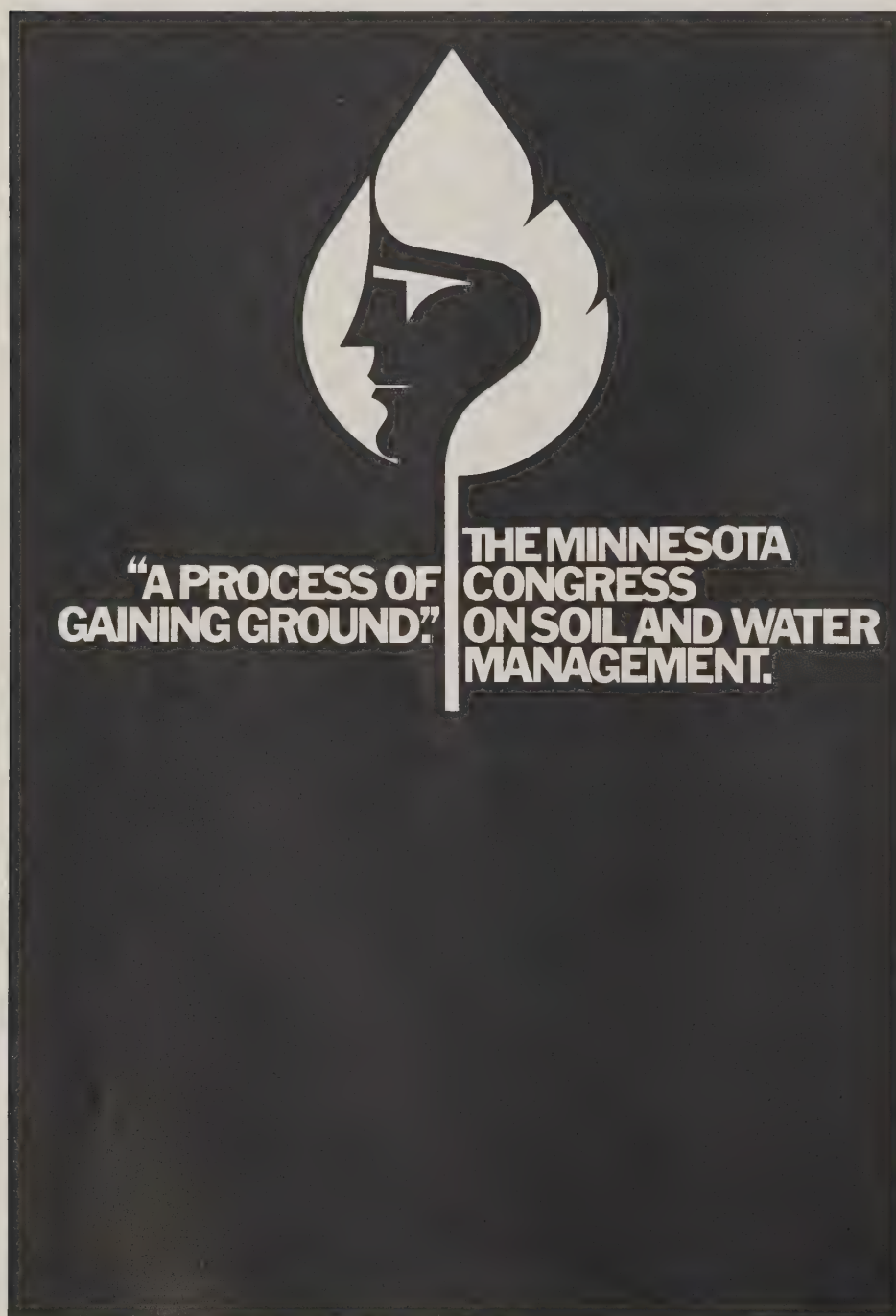
But the economic situation of those days forced Reyes to emigrate to the mainland. There, he performed agricultural tasks until he finally found a better-paying factory job. After many years, he returned to Puerto Rico and renewed his farming work on leased lands. Then came the El Melón project, where Reyes now owns his bit of land.

Because of the conservation work he performed on his farm and his enthusiastic promotion of conservation in his community, Reyes was selected the Conservation Farmer of the Year in 1976 by the Caribe SCD board of supervisors. Reyes' dream came true when he attained his conservation objectives. This was made possible by the El Melón project, a good example of raising the standards of living, through community improvement.

Mr. Reyes-Zamora is soil conservationist, SCS, Juana Díaz, P.R.

RCA: Gaining Ground in Minnesota

A logo, a slogan, and the concept of the Minnesota Congress were designed to signify the involvement of all Minnesotans in the RCA process.



"The 1977 Soil and Water Resources Conservation Act (RCA) is more than a law," according to Harry Major, Soil Conservation Service State conservationist for Minnesota. "It's a management tool, an organizational tool, and a unique opportunity for conservationists to reach the public and have the public reach them."

To fulfill the requirements of the national RCA legislation in Minnesota, the State is conducting "The Minnesota Congress on Soil and Water Management." Major says that when the Minnesota Congress is completed, the State will have "a coordinated program for soil and water conservation that ties together Federal, State, and local soil and water conservation agencies."

"The congress also will have provided Minnesotans with a wealth of information on natural resources," Major continued, "and will have allowed them to influence the programs that address resource problems in their respective districts."

The foundations for the Minnesota Congress were laid in the summer of 1978 when 92 soil and water conservation districts (SWCD's) held 299 meetings attended by 5,200 citizens of the State. These citizens voiced 14 resource problems that they felt were most pressing in their districts. Information was then collected that details the extent of the problems and the costs involved with solving them.

In June of this year, members of the SWCD's, personnel from the U.S. Department of Agriculture and other resource agencies, and representatives of the Minnesota Soil and Water Conservation Board (SWCB) met to propose programs to solve the resource problems that were identified at the

public meetings. Seven separate committees met to formulate proposals for each of seven regions.

The next step in the Minnesota Congress was the launching of a comprehensive public information campaign to explain the problems and proposals, again by region. The public will have an opportunity this fall to indicate how the proposals should be changed to best suit the needs of conservation districts.

Planning and conducting the information campaign has been one of the responsibilities of an "RCA team" consisting of SCS and SWCB personnel. The team, operating under the SCS State conservationist and the director of the SWCB, has responsibility for coordinating the Minnesota Congress. Team members decided that modern advertising techniques should be used to present the Minnesota Congress and the idea of good soil and water management to the public. Because of time and staff limitations, the decision was made to contract for information services from a private agency.

The funds for the contract were made available from national RCA funds through a grant by SCS to the SWCB. Because two levels of government were involved, both State and Federal contracting regulations were followed. The terms of the contract were formulated by the RCA team and government contracting specialists.

After the contract was advertised in March, bids were received from a variety of agencies, ranging from experienced public relations firms to newly established freelance advertisers. One firm specializing in "future planning" also submitted a bid. After reviewing the bids and analyzing each suggested campaign approach, the decision was

made to select an established advertising agency with experience in agricultural advertising.

It was this advertising agency which created the name, "The Minnesota Congress on Soil and Water Management." The agency wanted the name to signify that the process involved all of the residents of the State. In addition, it decided that a catchy title would be more likely to influence people to participate in the effort than would a less generally understood phrase such as "the RCA process." The Minnesota RCA team agreed.

The agency also devised the slogan "a process of gaining ground," and created a logo. Other duties of the advertising agency were as follows: solicit material support from private corporations (such as stationery, printing, and radio and television time); secure the services of a national or statewide celebrity with ties to conservation to star in radio and television public service announcements; produce the announcements and provide for air time; and secure the services of a radio or television "personality" to make local appearances. The announcements are scheduled for release in early August, with the local appearances occurring throughout August and September.

An integral part of the information campaign has been the development of a direct mail piece explaining the resource concerns, the proposals, and how the public can respond to the proposals. The advertising agency assisted with layout, design, and editing. This mail piece, aimed at reaching as many varied interests as possible, is scheduled for distribution in the middle of August. It will be sent to nearly 200,000 people.

Toward the end of August or the beginning of September, "The Minnesota Congress on Soil and Water Management Governor's Kickoff" will be held. This event, keynoted by Minnesota Governor Al Quie and the "star" of the public service announcements, is being held to underscore the importance of the Minnesota Congress and to demonstrate the multigovernmental and public participation aspects of the effort. Of course, it is also hoped that the resulting media coverage will influence larger numbers of Minnesotans to reply to the proposals.

In November, after the public responses to the proposals have been analyzed, each of the seven regional task forces will meet again, this time with members from the public at large. The job of the task forces will be to rewrite the regional proposals. These proposals will then be sent to the RCA team for inclusion in the State program.

The result of the Minnesota Congress on Soil and Water Management will be the implementation of a comprehensive State program to correct soil and water conservation problems. It is hoped that through the involvement of the public in writing the program, it will meet the needs of their conservation districts and that the districts in turn will support the program. If, indeed, the Minnesota Congress is successful in reaching this goal, it will mark a new period in the history of Minnesota conservation efforts.

Mr. Bernat is a public information specialist, SCS, St. Paul, Minn.

"Conserving the Nation's Farmland"

A new congressional study says that many Northeastern and Midwestern States are rapidly losing much of their best agricultural land, and that the Nation needs new policies to preserve its remaining farmland.

Rep. Robert W. Edgar (D-Pa.), chairperson of the 213-member Northeast-Midwest Congressional Coalition, said the new report underscores the need for protecting the Nation's prime farmland from urban sprawl and other forms of encroachment.

"Conservation of our prime farmland is important not only to the Midwest, but to Northeastern States as well," Edgar said. "About half of New England's farmland was taken out of production between 1959 and 1977—and those States already import four-fifths of their food from other parts of the Nation."

The study, "Conserving the Nation's Farmland," was prepared by the Northeast-Midwest Institute, a Washington-based research organization.

"This report confirms what many of us in Congress have believed for several years—that unless we do something, we will continue to see an alarming loss of the Nation's prime farmland," said Rep. James M. Jeffords (R-Vt.), a member of the coalition's steering committee.

"We simply don't know how much prime land we are losing each year," Jeffords said, "and we need better information to preserve this vital national resource. If the Nation is blind to this problem, our prime farmland will continue to shrink."

Edgar said the study showed that while the Northeast-Midwest region has

approximately one-third of the Nation's prime farmland, it has less than 18 percent of total national reserves. "This means our region potentially is more vulnerable to the continuing atrophy of our best agricultural land," he said.

In addition to describing the loss of prime farmland, the report identifies some methods being used by States and localities to address the problem. An analysis of the farmland protection legislation being proposed in the 96th Congress also is included.

Copies of the report may be obtained free of charge from the Northeast-Midwest Institute, 3589 House Annex No. 2, Washington, D.C. 20515.

Reforestation by Injection "Guns"

In many countries, reforestation programs are being planned by governments increasingly concerned with the urgent need to correct the abuses of past logging practices and with the practical problems of reforestation now in progress. Problems in restoring forest land may include the long, hard hours of manual labor now required in tree planting, as well as short planting seasons, remote locations, and inadequate financial resources. As a result, foresters are exploring the idea of mechanized tree planting.

According to John Walters and R. St. Jean of the University of British Columbia Research Forest, injection planting of tree seedlings seems to offer the greatest potential for the mechanization of the planting process. The seedlings' containers must be "bullet-shaped"

and rigid enough to withstand the impact of mechanical insertion into the ground. The young trees in these specially designed pots or "bullets" can be efficiently planted by inserting them into the ground with injection "guns."

Researchers at the University of British Columbia mounted three such guns on a U.S. Army surplus armored personnel carrier. The result: an automatic, self-propelled tree planter that can plant 20,000 seedlings in an 8-hour day. A major advantage in using the personnel carrier is that it can operate on slopes of up to 30 percent, and can easily maneuver over debris usually found in logged areas.

The bullets have two advantages: First, they provide maximum protection of tree seedlings during their transfer from nursery to planting site. Because seedlings in rigid containers can be planted before seedling roots become potbound, the bullets eliminate root deformation caused by most planting techniques. Second, the pot or bullet is designed to permit roots to grow out and soil moisture to seep in after planting. This can be accomplished either by container design only or by a combination of design and use of biodegradable materials.

A paper entitled "Self Propelled Tree-Planting Machine Using Injection Planting," by Walters and St. Jean, is available from the American Society of Agricultural Engineers. Call Roger Castenson at (616) 429-0300 and request Item WM-78-1586.

USDA Awards Top Honor to Boy Scout Council

Each year the U.S. Department of Agriculture recognizes a Boy Scout Council for outstanding work in conservation. This year's "Gold Seal Award," the top national honor, went to the Daniel Webster Council in Manchester, N.H. The Daniel Webster Council wrote a comprehensive conservation plan for managing its two camps, Hidden Valley Scout Reservation and Camp Carpenter, and has been enthusiastic and thorough in its implementation.

The council's ongoing conservation programs address forestry, wildlife, watershed management, recreation, and education. Wildlife projects include constructing wildlife ponds, trout spawning beds, and nesting boxes for wood ducks; identifying and inventorying deer yards and populations to help determine road and trail sites; and providing browse and cover by making brush piles and cuttings, and seeding with legumes. The camp, which averages 50 acres a year in timber stand improvement, employs a full-time forester who has developed a plan in controlled burning to accomplish the three objectives of timber management, wildlife habitat maintenance, and training in fire management and prevention. Under watershed management, the popular sport of swimming has given clean water in ponds top priority. The Scouts reduce pollution and sedimentation by building waterbars, and by seeding and mulching in open areas near ponds.

Clem Lyon has been directly involved in the Scouts' conservation projects both in his capacity as Soil Conservation Service district conservationist for Laconia County, and as

chairperson of the conservation committee for the Hidden Valley camp. SCS has assisted the Scouts by helping to survey, design, construct, and supervise the work on 3 miles of woodland access roads and two wildlife ponds. When asked about USDA's selection,

Lyon replied that the Daniel Webster Council earned the Gold Seal Award because of the "... magnitude of projects that have been done over a relatively short period of time" and because of the enthusiasm and volunteer work that the Scouts generated.

SCS Is Well Known in Iowa

According to a recent farmer poll in the *Des Moines Register*, the Soil Conservation Service is the most recognized and the most used Federal agricultural agency in Iowa. Of those polled, 97 percent had heard of SCS and 68 percent had used SCS services. SCS also ranked higher than any State agency.

Farm Agencies: How Useful Are They?

Have you used these agencies? Have you heard about them?

Federal Agencies	Yes, Used	Yes, Heard About
Soil Conservation Service	68%	97%
Agricultural Stabilization and Conservation Service	60	87
Federal Crop Insurance Corporation	32	88
Farmers Home Administration	24	87
Commodity Futures Trading Commission	14	78
Packers and Stockyards Administration	11	55
State Agencies		
Iowa State University		
Extension Service	65%	92%
ISU College of Veterinary Medicine	49	93
Iowa Dept. of Soil Conservation	47	91
Iowa Dept. of Agriculture	43	97
ISU College of Agriculture	39	86
Iowa Development Commission	9	64

Courtesy, Des Moines Register and Tribune Company.

Conservation Tillage Incentive

"When I leased this farm from my landlord some 6 or 7 years ago," said Jesse Dowdy, a farmer in Rayville, Mo., "he said he would lease it to me if I would cut down on erosion.

"At first, that seemed like quite a job until I talked it over with SCS District Conservationist Calvin Phillips."

Dowdy said he was impressed to know there were several conservation planning systems available through the local conservation district.

"The plan we worked out," he explained, "is in tune with my farming operation, saves the soil, and is keeping my landlord happy."

After Dowdy used a wheat and red clover rotation to control shattercane and other weeds, he planted fescue grass in the diminishing clover. With this system, he had weed control before

trying no-till, which may be a key to the success of the system. To be effective, many weed control chemicals must be thoroughly incorporated into the soil immediately after application. Proper chemical incorporation can be a real problem if great amounts of residues remain on the surface.

In May 1978, Dowdy planted 50 acres of no-till corn in fescue sod and 25 acres in wheat stubble.

"This no-till system definitely saves the soil," said Dowdy.

Phillips concurred, "No-till, zero-till, conservation tillage, minimum tillage, or whatever you want to call it is a good alternative erosion control system."

Phillips also recommends that farmers plan ahead by selecting fields with uniform soil conditions and types. Extreme variations in stand and chemical

Missouri farmers might ask, "What's a planter doing in ground cover like this?" Conservation tillage is catching on in western Missouri. Farmer Jesse Dowdy was pleased with his 1978 results and planted no-till corn again in 1979. Other farmers in the area followed suit.



performance can occur if land with different kinds of cover is included in a single no-till planting.

According to Ted Puetz, a representative of the Chevron Chemical Company, "An insecticide attachment is a must for a no-till planter. It should be used for inrow application to control rootworm. A planter box seed treatment should also be used.

"As for fertilization," Puetz continued, "since phosphate and potash move slowly into the soil, they should be applied during the fall. This allows plenty of time for freezing and thawing to take them down into the root zone."

Nitrogen can be put in as an overlay or broadcast in the spring. It is soluble and the rain will leach it into the root zone. According to Puetz, another plus for applying nitrogen in the spring is

that if it is used in solution, it can be mixed and applied with certain herbicides, thus eliminating an extra trip across the field.

Herbicides can be applied before or after planting, but must be applied before the corn emerges.

For those considering using herbicides, Puetz suggests answering the following questions:

- Which product can control my weed problem?
- Is there any possibility of having crop injury?
- Will the product carry over in the soil to the next crop?
- Is the formulation available and suitable for my equipment?
- Can it be mixed with liquid fertilizer carrier?
- Do I need special application nozzles or equipment?
- Does the product need to be incorporated? If so, how soon?
- Is the product affected by soil texture or organic content?
- Is the product adversely affected by drought or wet periods?
- Can the product be tank mixed with other herbicides to obtain a wide spectrum of weed control?
- Can the herbicide be used on more than one crop?

● In heavy rain, can the herbicide run off and damage grassed waterways or injure other crops?

● Will postemergence use create a drift hazard to adjacent crops?

Puetz says that three-fourths of herbicide failures can be traced to improper use.

Puetz offered the following no-till corn planting tips: "Don't plant when the ground is too wet. If it is too wet to plow, it is too wet to plant.

"Plant when soil temperature at seed depth at 9 a.m. is 50° F or higher. Plant shallow, about 1 ½ to 2 inches and plant slowly, about 3 or 4 miles per hour."

Eldon Ratcliffe, extension area agronomist in Richmond, Mo., adds another bit of advice, "As a system, conservation tillage must compete with conventional methods to be satisfactory. In most cases it can compete financially; but before farmers jump on the bandwagon, they should investigate the alternatives."

For many farmers, investigating new tillage systems will pay off by simply helping them evaluate whether their current practices can be modified or operations combined to cut down overall costs and save fuel.

Mr. Brejcha is resource conservationist, SCS, Independence, Mo.



Soil Conservation Service District Conservationist Calvin Phillips (left) works with Jesse Dowdy on his conservation plan.

No-Till Pays Off

by James E. Dean

Experimenting with reduced tillage has paid off for a South Georgia farmer and his son who have found the successful combination of experience, equipment, and conservation practices.

Carl and Randy Daughtry of Metter, Ga., farm 900 Coastal Plain acres of corn and rye and feed approximately 1,200 steers each year. With help from the Ogeechee River Soil and Water Conservation District (SWCD), this father and son team has experimented with several conservation tillage systems for the past 20 years.

The winning combination began to take shape in 1977 when the Daughtrys bought a machine that allows them to subsoil under the row, prepare a seed-bed, plant the seed, and apply herbicides—all in one trip. They call it "No-tillage-plus."

Inrow subsoiling eliminated the plowpan that prevents deep root growth of crops in the Coastal Plain. Carl said, "I have tried planting without subsoiling

and made half a crop. Subsoiling is the key to successful farming in our area."

The no-tillage system saves topsoil, according to the Daughtrys. "In my opinion no-till farming is the only method of soil conservation for our fields," Carl said. "Terracing and waterways are good, but they don't compare with no-till which includes vegetative cover and sod seeding. And we save money on fuel, equipment, and labor costs by reducing the number of trips over our fields."

The Daughtrys have planted in corn residue, in rye residue following grain harvest, and in standing rye.

"We have had less trouble and a better stand of corn by planting in standing rye, so we will plant all of our corn this way next year," Randy said. "We plant in standing rye that is about 4 feet high and spray three herbicides in the same operation. Paraquat, a strong contact agent, kills the living rye and weeds; atrazine will effectively control most

broadleaf weeds; and alachlor controls summer grasses."

The no-tillage system also means increased yields. In 1978, the Daughtrys averaged 138 bushels of corn per acre in a 248-acre field irrigated three times with a center pivot irrigation system. A smaller field without irrigation averaged 154 bushels per acre. Their county's average corn yield was 40 bushels per acre in 1978.

"Carl and Randy have been pioneers in reduced tillage or no-tillage farming in our area, but their system does not stop with their cropland. Back in 1956, they became cooperators with the Ogeechee River SWCD. This allowed them to get technical help from the Soil Conservation Service in developing a conservation farm plan for their entire operation. The plan included no-tillage for their pastures because our area lacks a permanent winter pasture grass," said Owen E. Gay, chairperson of the board of supervisors of the Ogeechee River SWCD.

Each fall the Daughtrys overseed ryegrass and arrowleaf clover into Pensacola bahiagrass and Coastal bermudagrass with the aid of a PTO-driven machine which places the seed right in the old sod. The summer grasses are not destroyed, and the overseeding takes only one trip.

"No-tillage farming on the Daughtrys' farms has been featured in farm tours, television programs, and in newspaper articles. Thanks to the persistence and ingenuity of these two men, more farmers switched to no-tillage in 1979," said Owen Gay.

Mr. Dean is district conservationist, SCS, Metter, Ga.

The Daughtrys have found that no-tillage works well on their South Georgia farm. After trying different methods and combinations, they produced the best stand of corn by planting in standing rye.



The Soil and Water Resources Conservation Act (RCA) of 1977 (Public Law 95-192) requires that on the "first full day Congress convenes in 1980, and at each 5-year period thereafter as long as the act is in effect," a detailed "statement of policy regarding soil and water conservation in the United States" will be sent to Congress.

Guiding the RCA program is an inter-agency coordinating committee representing seven U.S. Department of Agriculture (USDA) agencies and USDA's Office of Budget, Planning, and Evaluation; the Office of Management and Budget; and the Council on Environmental Quality. The coordinating committee meets once a week to guide RCA work. These meetings are open to the public. David G. Unger, Deputy Assistant Secretary of Conservation, Research, and Education, serves as chairperson of the coordinating committee.

The 1980 RCA Draft Appraisal and Program documents will be distributed for public review this fall. Primarily, the review is designed to obtain the public's views on the alternative strategies for the conservation, protection, environmental improvement, and enhancement of soil and water resources. Each alternative strategy will be a relatively complete "package" of actions and activities that could be undertaken by USDA to meet the Nation's soil and water conservation needs. The social, environmental, and economic impacts and tradeoffs of each alternative strategy will be presented to aid in making comparisons and evaluations.

During the public review period, a series of regional meetings will be held. The meetings will be conducted by Washington, D.C., based RCA teams. There will be afternoon and evening

August	
5-8	National Farm & Power Equipment Dealers Association, Detroit, Mich.
5-10	Joint Meeting of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, Fort Collins, Colo.
12-16	Conservation Education Association, Dingmans Ferry, Pa.
19-22	American Institute of Chemical Engineers, Boston, Mass.
September	
5-7	American Water Works Association, Chesapeake Section, Ocean City, Md.
9-12	International Association of Fish and Wildlife Agencies, West Yellowstone, Mont.
12-14	American Fisheries Society, West Yellowstone, Mont.
24-28	Federal Bar Association, San Antonio, Tex.
25-28	National Conference of Editorial Writers, Phoenix, Ariz.
26-30	The American Horticultural Society, Palm Beach, Fla.
30-Oct. 3	Farm and Industrial Equipment Institute, San Francisco, Calif.
30-Oct. 4	National Association County Agricultural Agents, Rapid City, S. Dak.
October	
3-7	American Horticultural Society, Portland, Oreg.
7-12	Water Pollution Control Federation, Houston, Tex.
10-12	Hardwood Plywood Manufacturers Association, Los Angeles, Calif.
12-18	American Association of State Highway and Transportation Officials, Hartford, Conn.
13-17	American Society of Planning Officials, Baltimore, Md.
14-17	Society of American Foresters, Boston, Mass.
16-18	Agricultural Research Institute, Washington, D.C.
20-25	National Environmental Sanitation & Maintenance Educational Conference/Exposition, Clearwater Beach, Fla.
22-26	American Society of Civil Engineers, Atlanta, Ga.
25-28	National Association of Biology Teachers, Inc., New Orleans, La.
28-31	American Forestry Association, Charleston, S.C.
28-Nov. 1	Congress for Recreation and Parks, New Orleans, La.
31-Nov. 4	The American Society of Landscape Architects, New Orleans, La.

meetings scheduled for each location. The meetings will allow team members to capture regional perspectives of public reaction to the RCA documents and, in particular, the alternative strategies. A transcript will be taken at each session.

Provisions are also being made to handle public comments made by mail

by those people wishing to submit written comments or those unable to attend one of the regional meetings. The RCA draft documents will have complete instructions on where and how to submit written comments.

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EEO—The Challenge Remains

From the Administrator

Equal opportunity must be far more than a letterhead slogan in employment, advancement and professional growth, and service to the public.

It must be far more positive than simply a lack of discrimination.

The Soil Conservation Service is effective in helping the many segments of American society manage natural resources because it has a diverse work force in kinds of people as well as in kinds of technical disciplines. I am proud of the capabilities we have and the efforts we have made to increase them.

Yet, when national studies clearly show that some minorities have not made the overall social and economic progress hoped for in the past decade, we need to be a little dissatisfied with our own contribution toward equality, and to do our part to advance it.

When the makeup of too many agency meetings still makes it appear that our staff and clientele are largely of one race and one sex, we need to be a little disappointed that our progress has not been faster, and to reemphasize the challenge.

Secretary Bergland and I are personally committed to setting goals and reaching equitable numbers of minorities and women in the SCS staff in each State, to make our employment mix more nearly comparable to the population mix in each State.

These annual and long-range goals can be reached only with a fresh commitment from every SCS supervisor, with full support of conservation district officials and our other partners.

The process does not *begin* with hiring: SCS has worked closely with individual high schools and colleges and with the 1890 Land Grant University system to interest more young people in conservation careers, to strengthen their academic study, and to give them summertime experience in soil and water conservation.

The result: Many more highly qualified young people who truly can fill a position instead of a quota.

The process does not *end* with hiring: Many SCS supervisors have given imaginative leadership through the upward mobility and other training programs—and in everyday work—to help employees build their skills, their team spirit, and their professional future.

The result: More people better trained for the work they do, better prepared for more responsible positions.

Working together, I believe we can attract and motivate the kinds of "person-power" needed for *all* the jobs that we share in meeting America's social and environmental goals. It is one of our highest priorities.

A handwritten signature in dark ink, reading "Mel Davis". The signature is written in a cursive, flowing style with a large, prominent "M" and "D".

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Secretary of Agriculture

Mel Davis, Administrator
Soil Conservation Service

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Soil Conservation

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- **Front**—Diane Reinhardt is Missouri's first woman district conservationist for SCS. The article beginning on page 6 and other articles in this issue present women at work in conservation.
- **Back**—Lorraine Stanelle, a secretary for SCS in the Georgia State office, gives another viewpoint on conservation in the article beginning on page 12.

A DC's Work Is Never Done

SCS District Conservationist Sheila Miller takes a contour reading in preparation for staking farmer Glen Miller's land for stripcropping.



"We have to be well trained in all areas of conservation—that's what is expected in the field," said Sheila Miller, Soil Conservation Service district conservationist (DC) for Lackawanna County, Pa. "We have to be knowledgeable in plant materials, field office management, information activities, agronomy, forestry, and soil science. We're everything all rolled up into one."

Along with Dick Kitchen, soil conservation technician, and Peter Zakanyecz, soil conservationist, Sheila directs SCS activities in this northeastern Pennsylvania County.

A 5½-year veteran of SCS, Sheila's background includes assignments at four SCS field offices and 3 years in her current DC post.

"We really need to try and help these farmers," Sheila said. "And one way to help is through the application of conservation practices."

"There are some people we can never reach. But a lot of times people see what's happening to their farms, get very disgusted with it, and say this can't go on," she continued. "It just takes a little bit of time. First, you have to get them to believe that you know what you're talking about; next, you have to show them what you're talking about; and then by word of mouth it gets around to other farmers who might be having the same problem."

In Lackawanna County much work is needed in surface mine reclamation, erosion and sediment control, stormwater management, and nonpoint source pollution or 208 planning.

"In order to do a good job, we have to get to know the people, to be part of their community, and show them that we care what happens to their farms and community." Sheila cares, and

most of the local district cooperators know that she cares.

Glen Miller is one. Glen, a dairy farmer and cooperator with the Lackawanna County Conservation District, has a 25-acre field that for years had been farmed as one large field providing no real erosion control. Sheila explained to him the principle and benefits of contour stripcropping and, with the aid of her coworkers, staked out the land for stripcropping. Glen Miller was thankful for the conservation assistance.

"We need to keep in mind why SCS was established in the first place," Sheila explained. "Right now we are working on many different programs, but we should always remember the need for assistance to farmers and the agricultural end of conservation planning that is our mainstay."

Northeastern Pennsylvania is coal country and Lackawanna County has its share of problems associated with coal mining. "Every time we get a rain, coal waste washes off into streams and there is mine water everywhere," Sheila said. "It's a real problem, but mined land stabilization with adapted plant materials has helped us out a lot."

Sheila is also evaluating the results of a project in which SCS participated to demonstrate the value of treated municipal sludge as a soil conditioner and fertilizer for the revegetation of lands disturbed by coal mining activities. Properly treated and stabilized sludge is a valuable resource which can be recycled and utilized. A 10-acre demonstration site in Scranton was one of several such projects being conducted throughout the State.

The results from this project show that treated municipal sludge can be

used to reclaim barren disturbed land with no adverse effects on the vegetation or ground water quality and no risks to animal or human health.

Most of Sheila's field activities consist of visiting farmers to discuss conservation planning which meets their individual needs and solves their conservation problems and to explain cost-share programs or anything new in conservation that may help them.

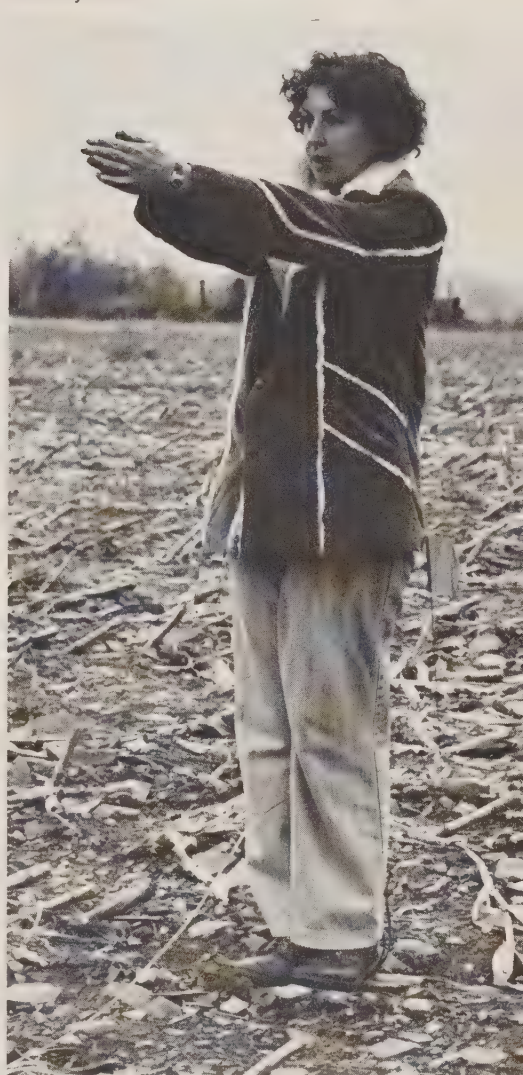
Constant communication is the key. "We like to keep in touch with our people and line up work for next year," Sheila explained. "We like to keep ahead and get some conservation practices staked out and designed during the winter."

"But snow cover is a real problem. We can't work in the field too much from November through March, so that's when we have more time for updating records and scheduling next season's work by writing letters, making phone calls, or making personal visits."

"What's been happening the last couple of years," Sheila concluded, "is that by word of mouth people find out about us and our programs. More people are aware that we are around."

Mr. Kupelian is a writer-editor, Information Division, SCS, Washington, D.C.

Miller tries to get as much field work in as she can before snow comes to northeastern Pennsylvania.



From City to Field Office

by Enid Yurman

In October 1978, Diane Reinhardt became Missouri's first woman Soil Conservation Service district conservationist at the Unionville field office in Putnam County. In over 3 years with SCS, Reinhardt has worked in four different counties and feels that she knows northwestern Missouri well.

Although she grew up in a city, Reinhardt decided on a career in conservation while still in high school. "Conservation is pretty much my nature," she said. "I try to live it in my personal life."

She says that she developed her love of nature and concern for the land during the many hiking trips her family took in national parks all over the country. She also did some traveling in Europe where she was impressed by the great numbers of people walking and bicycling.

Reinhardt received a bachelor's degree in agronomy in 1976 from the University of Missouri at Columbia. She

first learned about SCS from guest speakers in her water management and soil conservation courses. Since the agency's mission seemed to fit in with her goals and background, she decided that working for SCS was the next logical step. She worked part time at a field office during her last semester, then, after graduation, she plunged into a full-time career with SCS.

"Working in the field office in Harrison County was my first time in the 'real world,'" said Reinhardt. "It wasn't always pleasant; for example, I wasn't used to the gruffness of some of the men or the tremendous workload in the field."

Besides the exposure to different conservation practices, Reinhardt also learned the art of "small talk" with the farmers. "Talk about such things as the weather is really a way of communication for the farmers," she explained. "They're talking about their livelihood." She enjoys working with the farmers

and finds their flow of talk and sense of humor refreshing.

From Harrison County, Reinhardt moved to Livingston County where she spent the next 14 months under the skillful supervision of District Conservationist Lyle Noblitt. Reinhardt is grateful for the excellent model Noblitt provided by his friendly attitude and firm assertiveness.

In her present job as district conservationist in Putnam County, Reinhardt thoroughly enjoys her new responsibilities of supervision, administration, and management. In accepting a position with more responsibility, she maintains that a woman does have to work harder to prove herself and her professionalism.

When farmers ask her, "Are you one of those women libbers? Have you started chewing tobacco yet?" Reinhardt kids right back with them. She knows that when they see her setting up her instruments and answering

SCS District Conservationist Diane Reinhardt is using a level to stake out a farm pond. She signals to the rodman that she has taken a reading and that he can move on while she records the numbers.



their technical questions, her competence will erase any doubts. She's learned to be assertive and at the same time accepting of whatever she faces; she "lets changes come at their pace."

One important practice Reinhardt works with the farmers on is pasture management. "In our area, overgrazing is a big problem," she explained. She's trying to generate some interest in warm season grasses and has persuaded one farmer to use seed obtained from an SCS plant materials center. Reinhardt hopes this will serve as a demonstration plot and example to other farmers.

Another concern is soil mapping and interpretive soil information for Putnam County. "Everything's based on soil—it's the basis for planning and engineering." Reinhardt is currently trying to drum up the interest of local residents.

Her most important goal in her work is conservation education. "It's important to help people's thinking to begin

with rather than try to change their attitudes once they're set in their ways," she explained. "I enjoy working with the children—as well as the adults—and being a model for the girls. I like to share my enthusiasm with them and show rather than tell them what conservation's all about."

Reinhardt is working hard to establish and implement a conservation education program in the Putnam County schools. She initiated a project at one grade school. Everyone, from kindergartners on up to teachers and principal, was involved in planning and constructing a five-row windbreak.

Reinhardt explained to the children that in planting a different species of seedling in each row, the smallest species is placed on the windward side, normally following the order of shrubs, conifers, and then hardwoods. Reinhardt also explained the reasons for the windbreak, including wildlife cover and shelter from the wind, and made a point of stressing

the multiple-purpose nature of conservation practices. She hopes to get a couple of outdoor classrooms started there.

"My advice to others interested in starting programs in conservation education is first to establish contact with the different State agencies that can provide funding, and with foresters, wildlife specialists, and other experts for technical assistance," said Reinhardt. "Then 'sell' yourself to school officials, be available to these different people, and get input from them."

Diane Reinhardt is excited about her work in SCS, and looks forward to the challenges and rewards in making people aware of the great need for conservation.

Ms. Yurman is a writer-editor, Information Division, SCS, Washington, D.C.



Reinhardt examines a hayfield with a farmer to determine the proper time to cut the hay based on the physiology of the plant species. Timing in cutting can make the difference between coarse, unpalatable hay and hay that has more protein and is of a better quality.

Hard-Working Conservationist



Mary Rose, according to SCS District Conservationist Carrol Tyler, is equally at home working with her cattle, managing her household, or, as shown above, fixing a leaky clean-out valve in her irrigation system.

Overseeing 300 acres of farmland, managing 100 head of cattle, and serving as chairperson of the board of supervisors of the North Side Soil Conservation District (SCD) are jobs many people would avoid—but not Mary Rose of Jerome, Idaho.

Rose is the first woman supervisor of a soil conservation district in Idaho and the first woman in the State to be elected chairperson of a board of supervisors.

She thrives on hard work and doing her bit for the “space she occupies.” Rose’s philosophy is “we all have a certain due for the privilege of living in a democracy,” and conservation of the Nation’s natural resources is high on her list of personal responsibilities.

Each of the seven supervisors of the North Side SCD is head of a committee. Rose, besides serving as chairperson of the district board, is head of the district operations committee.

As head of the committee, Rose develops the long-range plan for the district’s soil and water conservation program, develops the district’s annual work plan, and reviews the district’s monthly work plan. Her other duties include reviewing conservation plans and long-term agreements.

The other six committees are resource planning, information activities, legislature, conservation education, finance and property, and the committee for activities related to the Soil and Water Resources Conservation Act (RCA) and to reducing nonpoint source pollution of streams and rivers, or 208 planning.

“It’s a cooperative effort,” said Rose. “We all work together and keep each other informed of district activities. The board members are super

people and they are a real pleasure to work with. They are all truly dedicated conservationists."

RCA, passed by Congress in 1977, is a continuing evaluation program that the Soil Conservation Service and conservation districts will be involved in for the next 5 years. John Ottman, North Side SCD board member and head of the RCA and 208 planning committee, is in charge of conducting public meetings in the district to secure citizen participation.

"We are anxious to receive citizens' comments through RCA," said Rose. "Through the public meetings we can find out what direction the people want the district to take in conservation. RCA will give us an accurate analysis of conservation problems and an outline to use in attacking the worst problems most effectively.

"One of the major concerns of almost all the citizens in the North Side SCD is the incompatibility of housing developments and farm operations," said Rose. "People in subdivisions next to farms complain about the noise and smell, while traffic and litter from the subdivisions conflict with farm operations." Rose is helping lead the effort to resolve the conflict over the use of land in Jerome County.

Citizens are also concerned about the spiraling costs of land, machinery, energy, and other items associated with farming. They are concerned about pollutants in the Snake River, sediment and other pollutants in irrigation return flows, weed control, the depletion of wildlife habitat, the use of off-road vehicles, and the effectiveness of government programs.

As part of its 208 work, the district is concentrating on solving critical erosion

and sedimentation problems in the Hazelton Butte area. The area is used mostly for growing potatoes and is steep and intensively irrigated. The potatoes are harvested in late fall and the heavy machinery used for harvesting compacts the soil. The compacted soil freezes and winter rain storms cannot soak into the ground. The rain runs off carrying precious soil with it to streams and rivers. Some of the sprinkler irrigation systems in the area also contribute to erosion and sedimentation.

According to Carrol Tyler, SCS district conservationist in Jerome, the district is promoting deep chiseling on the contour. It opens up the soil so water can soak in instead of running off. The district is also promoting irrigation water management, sediment basins, and better cropping systems such as crop rotations of alfalfa and other grasses with the potatoes to improve soil tilth and fertility.

"We have been in contact with the farmers in the Hazelton Butte area," said Rose, "and their cooperation is excellent. Some practices that will probably be used are fall seeding, contour plowing, and redesigning sprinkler systems. Some people are even experimenting with different methods of harvesting potatoes.

"I feel the biggest challenge facing districts today is allocating time in order to fulfill responsibilities under RCA and 208 and still remain effective in serving individuals," said Rose. "District services to the individual landowner are a critical part of what we do on a local level. It's important for districts to set priorities to get everything done—to be most efficient."

Girl Scout activities, Rose says, sparked her interest in conservation.

Mary Rose first became acquainted with SCS and the North Side SCD when she and her husband, Wesley Rose, an optometrist, began farming in Jerome County. Through the district, SCS provided them with technical assistance in setting up irrigation water management practices and pasture management.

Rose and her husband work as a team in managing their 100 head of Charolais cattle. But, when it comes to farming their 300 acres of hay, corn, and grain, Mary is in full charge.

"Mary Rose is equally at home driving a tractor, managing her household, irrigating cropland, discussing cattle management, running a board meeting, or making a presentation at the State Convention of Soil Conservation Districts," said Tyler. "I have worked with many soil conservation district boards and she is an outstanding chairperson."

"Making a contribution toward improving conservation is the most rewarding thing about my work with the North Side SCD," said Rose. "I feel I get a lasting result for my energies."

Based on an article in the *North Side News*, Jerome, Idaho, March 29, 1979.

Satisfaction Comes from Solving Problems



SCS Soil Conservationist Jeanette Barnett (left) makes field notes as she surveys for a pond site. Farmer Rosalyne Bledsoe (right) requested assistance from SCS in locating and designing the pond to provide erosion control, livestock water, and recreation.

Soil Conservationist Jeanette Barnett enjoys helping people solve problems on their land. Barnett joined the Soil Conservation Service in Columbia, Mo., in May 1976 after graduating from the University of Missouri at Columbia. In February 1978, she was assigned to the Miller County field office at Tusculum.

At the university, Barnett's major area of study was horticulture, but she also took courses in agricultural engineering and agronomy. Coming from a farming background, Barnett said, "I was surrounded by agriculture people most of my life, and had always raised my own gardens and read a lot of gardening literature."

Barnett puts her training and experience to good use by advising landowners on how to better manage their land. Her biggest satisfaction comes from "going out on a farm which has an ugly erosion problem, suggesting a suitable solution, and then seeing the conservation improvements completed."

On one project, she assisted Rosalyne Bledsoe, who wished to get rid of a gully by constructing a pond to supply water for her cattle. Barnett's first step was to help Bledsoe study the site and decide on the size of the pond needed.

When Bledsoe expressed an interest in stocking the pond with fish, Barnett advised that the Missouri Department of Conservation could provide them. Barnett pointed out that the dam would have to be high enough to provide at least 10 feet of water for the fish. Barnett then laid out the exact bounds of the future water impoundment. Water levels are established to provide minimum depths needed for fish and to cover the active area of the gully.

The next step was to stake the core

trench which the conservation contractor would dig. This is a long ditch, which runs under the dam site. The trench is dug deep enough to expose all sand, gravel, or other material which would allow water to leak past the dam site. The core trench is backfilled and the dam is constructed of good clay and carefully compacted to form a watertight seal. A principal pipe spillway is installed to let the excess water out. An emergency spillway is also installed around one end of the dam to handle extreme floods.

The pond water is piped through the dam to a stock water tank. A filter strip of grass is seeded around the pond. The area is then fenced to protect the water and grass strip from the cattle. The pond provides soil erosion control, water for livestock, fish habitat, and recreational benefits.

Another example of conservation practices that Barnett helps landowner's install is animal waste lagoons. Lagoons are used for livestock confinement operations and in Miller County usually for hogs. The waste matter is flushed from the hog house and feeding floors out to the anaerobic lagoon. These lagoons are built to certain dimensions to insure proper bacterial action to break down the waste. When the lagoon fills up, normally once or twice a year, the landowner will pump the lagoon effluent to a soil plant filter which, in that area, is usually pasture. The effluent fertilizes the pasture through an irrigation system such as a traveling gun which shoots it out onto the land.

Besides ponds and lagoons, Barnett also helps design and lay out diversions and waterways, assists landowners in selecting seeding mixtures for their

pastures and managing them, and gives advice on streambank erosion control. She writes a biweekly column for the local papers in which she tries to weave a conservation angle around various topics of interest to the county folks. Barnett explained that they don't do much terracing since it's not a cropland area. Miller County is made up of trees on the steeper slopes and pasture on the gentler slopes.

Another important part of Barnett's job is helping landowners develop resource conservation plans. Developing plans is time consuming, but is vital to help people successfully apply conservation practices.

Barnett takes the time to define the role of SCS as a technical assistance agency and to explain to the landowner the relationship of SCS to conservation districts and to the Agricultural Stabilization and Conservation Service, which provides the funding for conservation practices.

Barnett also tells the landowners about various interagency programs available to them. One is an excellent arrangement, under a memorandum of understanding, between the soil conservation district and the Missouri Department of Conservation. On a first-come-first-served basis, 12 new cooperators can sign up each year to get a mix of milo, millet, and soybean seed provided by the department. The cooperator is given enough to plant one-quarter of an acre which will produce wildlife food in the winter. This program serves as an excellent inducement to get more wildlife food and cover on the land. SCS provides the cooperator with planning assistance in applying to this program.

Jeanette Barnett enjoys her co-

workers who have found her to be a competent, dedicated employee. As for the farmers, Barnett says that "you couldn't ask for a better group of people to work with." Barnett stated simply that her own goals are to give people the best service that she can.

Based on an article in the *Eldon Advertiser*, Eldon, Mo., April 5, 1979.

A New Look at Conservation

by Lorraine Stanelle

Employees in the Soil Conservation Service State office in Athens, Ga., who do not usually travel or spend time in the field are getting the chance to find out about field office operations. Each employee has been assigned to spend a week with a district conservationist and do the kind of work that field personnel usually do.

Participants report that the field experience has been valuable. The State office employees are coming back with a greater appreciation for the tasks of field personnel and a better understanding of their own role in our conservation mission. In the following article one of the State office employees shares her experience in the field.



Lorraine Stanelle holds the surveying rod for SCS District Conservationist Johnny Mattox as they conduct a construction check on a farm pond.

I left my office in Athens to spend a week in the Soil Conservation Service field office in Hall County, Ga., to try to learn something about conservation practices applied to the land. SCS has a long list of conservation practices. What could I learn in 1 short week? Quite a lot!

One widespread conservation practice I observed was conservation tillage. Most of the row cropping done in Hall County is done by the conservation tillage or minimum tillage method. In using this method, wheat or rye is planted in late fall or early spring and as soon as it's high enough, it is cut for silage. The stubble is then sprayed with chemicals to stop its growth, and corn is planted directly into the stubble without reworking the soil. This provides a mulch to hold the moisture and prevents wind or water erosion of the soil. It also saves time and fuel.

Another conservation practice I looked at was streambank protection along Little River. Several years ago, the river and its tributaries suffered damage from an extremely severe flood. The rushing waters eroded the streambanks, causing them to actually fall into the streams and block them. SCS personnel walked the streambanks to assess the damage and determine where the streams needed to be cleared and the banks protected. One method of protection they recommended was riprapping or, as I explained to my fellow office workers, laying stones along the banks of streams to hold the soil in place.

I noticed as we drove from place to place that most of the roadsides in Hall County have already been seeded and stabilized. They look great! There are no more ugly gullies with mud washing

down onto the highways.

One afternoon I helped some of the SCS field people survey a 200- by 250-foot area for a waste treatment lagoon for a dairy operation. We divided the area into 50-foot squares and put a flag at the corner of each square. We set a temporary bench mark and gave it an assumed elevation. Then we determined the elevation (or depth) at each flag. With this information we were able to determine how much water (or sewage) the area would hold. The temporary bench mark can be used to stake and check the lagoon. We also took some soil borings which revealed good moisture-holding clay.

Another place we visited was a farm with 40,000 laying hens. This landowner also needed a waste treatment lagoon. SCS field people had already surveyed an area in front of the building, but after studying their findings, they and the landowner decided an area at the back would be more suitable.

Depending on whom you talk with, Hall County is the largest chicken-producing area in the State, the United States, or the world! I'll go along with the largest in the world. I've never seen so many chickens, both hens and broilers.

We stopped to talk with a landowner who has 300 head of beef cattle and the largest vineyard in Hall County. He also keeps a dozen or so turtles for eating. I was told a turtle has seven different kinds of meat and is absolutely delicious. Some day I may find out, but I'm not in any hurry.

I learned how a cutoff, sometimes called a keyway or core trench, for an earth dam is laid out, how to survey a waterline for a lagoon and a farm pond,

and how to survey in woods through thick underbrush, around trees, and across gullies. I felt fortunate that neither spiders, wood ticks, chiggers, mosquitoes, nor snakes bit me. Not even poison ivy laid a finger on me. It was a great day!

Another afternoon I went with the SCS people to Upper Mulberry River Watershed Site No. 8 where a dam is being built to create a lake. I helped them set stakes on the slope of the dam, measuring (with the level again) upward from each of the previously set stakes, and then sinking a hub stake to the correct elevation. This hub will be used for the next series of stakes to be set further up on the slope. The contractor who is building the earth dam uses these stakes as a guide in mounding the soil for the dam.

We also took a compaction test of the soil in the dam. These tests are taken at frequent intervals; in fact, this was the 52d test. We determined that the soil was being packed solidly and was neither too dry nor too wet. If too dry, the soil tends to "fluff" and not pack down; if too wet, it tends to "slide" because the moisture keeps the soil apart.

SCS people give technical assistance to individuals, corporations, educational institutions, and units of county, State, and Federal governments. Some of the conservation practices I saw, but missed helping with, were working with a landowner to decide the best place for a farm pond, and helping another landowner stock his pond with baby catfish.

We took a quick look at Hall County's Alberta Banks Park, where SCS people had provided assistance on site selection for three baseball fields

and developed vegetative plans for the park. We also took a quick look at Gainesville Junior College, where SCS people helped turn a critical area into a useful and attractive pond, and where they had designed a water disposal system, diversion terraces, and a drop chute. They also gave Hall County assistance with leachate ponds, sediment basins, water disposal systems, and vegetative plans for the landfill.

We took a little longer look at Lake Lanier Islands. This is a beautiful 1,200-acre park, federally owned and State operated, where you can swim, fish, ride horses, take a boat tour, play golf, and rent a houseboat or a cottage. SCS people helped with the vegetation plan for the roads inside the park, soil

information, and laying out ponds for rainbow trout.

I learned the purpose of conservation practices is to protect both the soil and the water. Keep the two separated. Keep the streams clean and clear. Don't work the soil to death; treat it gently and keep it covered with grass, crops, trees; it will support all these and more.

For someone who spends day after day in an office, I learned quite a lot during my week in the field and enjoyed every minute of it.

Ms. Stanelle is a secretary,
SCS, Athens, Ga.



Stanelle checks the amount of mulch left in soybeans planted using conservation tillage.

Women's Conservation Tour

by Lynn J. Post



SCS Soil Conservation Technician Stella Mumme maps the route for the women's conservation tour. She planned stops to show the women various conservation practices which were successfully carried out by local farmers and ranchers.

"Many women can and do effectively manage farm and ranch operations," said Stella Mumme, a Soil Conservation Service soil conservation technician in south Texas.

Some of the women that Mumme worked with in the Medina Valley Soil and Water Conservation District (SWCD) had inherited farms and operated them alone or with their families, and some women were divorced or widowed and had suddenly found themselves totally responsible for managing a large ranch or farm.

Mumme recognized that the women in the district had special conservation needs. Many times people would take advantage of the inexperienced women farmers and ranchers by overcharging them for work done or advising them to make unsound management decisions.

Mumme took her concern to the SCS staff and the Medina Valley SWCD board of directors. They decided to set up a conservation tour designed especially for women. The SWCD sponsored the tour and SCS personnel helped plan and conduct it.

In May 1978, 150 women attended the district's annual ladies conservation tour. It was advertised on the radio and TV, in newspapers and the district's newsletter, and by personal contact. A San Antonio TV station even sent a crew to cover it.

The women viewed sites demonstrating irrigation farming, critical area treatment, brush management, range management, wildlife habitat management, and fishpond management.

They observed one system of irrigation farming which included the use of an irrigation well and an irrigation reservoir. "In growing corn there are certain critical times when the plants need

water to assure proper growth and production," Mumme told the women. "Water from the well is pumped into the reservoir and at critical growth times the corn can be irrigated from both sources, allowing farmers to irrigate more acres at the same time."

Also at the irrigation farm the women saw crop residue left on the soil surface to break up raindrop splash and improve soil tilth and fertility. Leaving the residue instead of grazing it or plowing it under, the women learned, protects the soil. Also, when the stubble decays, it is incorporated into the soil as mulch.

When cattle graze streambanks in Medina County, they strip the grass and leave woody brush which provides little protection for the soil. In places, deep rills and gullies, 5 to 20 feet wide, have formed. The women on the tour viewed a site where streambanks had been shaped to lessen the slope and planted in 'Coastal' bermudagrass to stop erosion.

"When you plant small sprigs of bermudagrass which already have roots instead of seeding it, the grass sends out runners faster to hold the soil," said Mumme. "Also, 'Coastal' bermudagrass does not produce viable seed."

Another problem for farmers and ranchers in south Texas is the infestation of blackbrush, whitebrush, and other woody plants. These plants rob moisture from grasses, block the sunlight, and prevent cattle from grazing what could be good pastureland.

The women on the tour discussed three ways of controlling brush that are being used in Medina County. One way is clearing out the brush with a bulldozer and stacking it and burning it. The land is then plowed and raked to pull up the roots and the area is

sprigged or seeded. To prevent soil loss until the grass takes hold, this method is usually used in summer or winter, if possible, when rainfall is the lightest.

Another method is aerial spraying to kill the brush. A third method, similar to aerial spraying, does not disturb the soil or the grass that is already growing in an area. Pellets of a chemical are spread from the air or with a ground spreader. The pellets are activated by rainfall and the chemical is taken up by the roots, killing the brush plants.

But whichever method of controlling brush is used, SCS recommends leaving strips of brush and other cover for wildlife habitat. Quail, dove, wild turkey, javelina, deer, and other wildlife common to the area need cover.

At the fishpond management site on the tour, the women discussed the construction of fishponds and tanks and what needs to be considered in choosing a site for either. They learned that a fishpond needs to be fished to promote production. It was noted that fishponds are also used for watering livestock and wildlife.

"The Medina Valley SWCD's ladies conservation tour gave the women farmers and ranchers conservation and management information they needed and provided them with an opportunity to discuss their problems and concerns with other women involved in farming operations," said Mumme.

"Whether these women are managing a farm or ranch alone or with their families, they have a tremendous responsibility and they are looking for help. Through the tour, SCS and the Medina Valley SWCD told the women the kinds of assistance they could give them and encouraged them to join the conservation effort."

Most of the women attending the tour owned from 5 to 10,000 acres of land in Medina and surrounding counties and most of the women were cooperators with the Medina Valley SWCD. The women ranged in age from 16 to 80 years old. Some came from as far away as Oklahoma City, Okla., and Austin, Houston, and San Antonio, Tex., to attend the tour.

Mr. Post is soil conservationist, SCS, Hondo, Tex.



At one stop on the tour, Stella Mumme and Vernon Grunewald (left) join with irrigation farmer Jack Hendley (right) in explaining proper application of water to corn.

Check the Soil First

It's Good Business

by Gene Warren

Opening the first mobile home park in Fenton, La., was a dream come true for Herbert Keyes.

Besides holding down a full-time job in Lake Charles, Keyes had dabbled in farming with his father, Bailey, on the family's 40-acre farm and had worked on building up a herd of 15 cattle.

"But cattle prices dropped, and in 1977 I got together with my brothers and sisters and suggested the trailer park," said Keyes. "All of us pooled our finances, and we began putting the park into shape."

The mobile home park is on 8 acres of the family farm. The rest of the land is in soybeans and pine trees. Keyes said he put a lot of thought into the project before he drove the first stake or put down money for financing.

"To tell you the truth, I looked at a lot of trailer parks and talked to many people before I made the plunge," he said. "What really sold me on the idea was that there were no trailer parks in the area. I figured I could make it if I went at it the right way."

Keyes and his father were already cooperators with the Gulf Coast Soil and Water Conservation District and had learned about the limitations of some soils. So one of the first things Keyes did in planning the trailer park was to call on Soil Conservation Service District Conservationist Terry Clement. Clement went over the land and discussed with Keyes soil types, drainage needs, and certain plants adapted to the area.

Based on the soil information Clement provided, Keyes selected a tree-covered area that was well drained and firm enough to support the weight of the trailers.

"One thing I learned was that shade

on trailers can cut the use of electricity in the summer by as much as 50 percent," Keyes said. "You see, most parks I visited had no trees. I figure my trees are a drawing card. If a fellow can see he can park his trailer in the shade in my park and can save money on his electricity bill, well, chances are he's going to come to me."

Keyes completed the park in mid-July of 1978. He has locations for 25 trailers. "Anything more than 13 trailers will be profit," he said.

On Clement's recommendation, Keyes planted most of the park area with bermudagrass. Under the trees in the park he planted shade-tolerant St. Augustine grass.

Clement also helped Keyes determine the best site for an oxidation pond for the park. Sewage from the trailers flows into the pond for aerobic treatment.

"You have to make the area pretty," said Keyes. "Attractiveness is important. I plan to put a recreation area next to the park and build a washateria and recreation hall within the next year or so."

Keyes' 12-year-old son, his nephew,

and his sister help take care of the park grounds.

Keyes says he hopes to make the park stand on its own and bring in enough to support his family. "When that happens, I plan to work full time at my business." He says that working at home will allow him to become more active in the community. Already he is coach of the community's Little Dribblers basketball team, and has helped the team win the State championship. Keyes is active in his church and works closely with the 4-H Clubs.

"I want to do more but can't when I work so far away from home," said Keyes. "I figure that a good-paying business will help me be a better citizen in the community."

Herbert Keyes has come a long way from the days when he was raised in a two-room farmworker's house. But the way he sees it, a fellow with a dream will work mighty hard to make it come true. That, in fact, is what Herbert Keyes has done.

Mr. Warren is public information officer, SCS, Alexandria, La.

SCS District Conservationist Terry Clement (left) and Herbert Keyes examine bermudagrass that Keyes established on his mobile park land. Clement recommended a shade-tolerant grass to be planted under the trees.



Farmer Controls Erosion Woes

Reprinted from the *Statesboro Herald*, Statesboro, Ga., May 2, 1979.

by Jerry Hancock



E. B. Lee and his wife, Sarah, take time out from their farming operation to do some gardening around their home.

Faced with troublesome erosion of his cropland, E. B. Lee, Jr.—a Bulloch County, Ga., farmer—recognizes the value of soil conservation farming operations as a boost to production.

Lee began farming in 1946 as a sharecropper and in 1951 bought his first 50 acres of farmland.

Lee then realized his steep, sloping cropland was washing away. He became concerned about it. Needed plant nutrients were washing from the soil, and the rough terrain hindered his equipment.

"The washes were so bad you could hardly cross them with a tractor," Lee said. The fields were losing topsoil at an annual rate of 12 tons per acre.

In 1953, Lee found out about the Soil Conservation Service. As a cooperator with the Ogeechee River Soil and Water Conservation District, he received technical assistance from SCS in planning and designing a water disposal system of terraces and grassed waterways.

This terrace system along with proper conservation cropping systems adequately controlled the erosion problem on Lee's field for 15 years.

However, in 1968 after changing to

four-row equipment, the terrace system was redesigned. Parallel terraces were constructed and waterways were shaped and established to grass.

In 1977, SCS assisted Lee with planning and designing an additional waterway, and in 1978 Lee installed another parallel terrace and grassed waterway system on another cropland field.

In the meantime, Lee has bought additional farmland and presently owns 170 acres and rents other cropland. Corn, soybeans, peanuts, tobacco, and hogs give him a diversified farming enterprise.

More water disposal systems are planned for Lee's cropland. Also, with the increased need for irrigation in stabilizing farm incomes in Bulloch County, he is planning to construct farm ponds. He said he will ask for SCS assistance in site location, design, and checking construction of the ponds.

"It is a pleasure working the land after conservation improvements have been installed," said Lee.

Mr. Hancock is district conservationist, SCS, Statesboro, Ga.

Lee checks the growth of young corn plants on terraced land. He expects a higher yield because his parallel terraces reduce erosion, retain runoff water, and improve farmability.

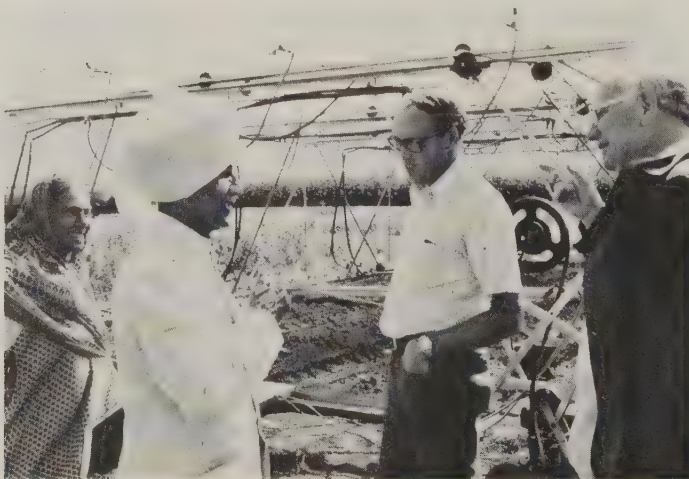


Taking Soil Conservation to India

SCS State
Conservationist
Harry Major reviews
progress in
Minnesota soil and
water conservation
work with Madhavro
Shirole.



Mr. and Mrs. Shirole
discuss the operation
of a rainulator used in
soil erosion research
with agricultural
research staff at the
North Central Soil
Conservation
Research Center.



by Thomas C. Gahm

Thirty years ago several States in India began soil conservation programs modeled on the ideas of Hugh Hammond Bennett, father of soil conservation in the United States and first Chief of the Soil Conservation Service.

Madhavro Shirole was the person who translated Bennett's ideas into action in India, after he visited the United States to study under Bennett and other conservationists during 1946 and 1947.

In 1978 Shirole returned to the United States for the first time since his training with Bennett. Now retired, the 80-year-old Shirole's visit this time was personal rather than official, but his interest in learning all he could about new developments in soil conservation research, planning, and application apparently had not waned. He wanted to talk about conservation and compare notes on how conservation technology in the two countries had progressed during the last 30 years.

The SCS State Conservationist for Minnesota, Harry Major, gave Shirole an overview of SCS conservation planning procedures and progress in the various SCS programs in Minnesota and throughout the country. He arranged for Shirole and his wife to visit an SCS field office and some district co-operators' farms. Since Shirole was also interested in research, Major made appointments for him with the Minnesota Agricultural Experiment Station and USDA's Science and Education Administration's North Central Soil Conservation Research Center at Morris.

Keith Huston, director of the experiment station, and Robert Holt, director of the research center, filled Shirole in on the latest State and Federal research. Shirole said he would put what

he learned to good use in his present position as a consultant to soil conservation programs in his home State of Maharashtra in western India.

He collected dozens of soil conservation publications. "I carried cartloads of Soil Conservation Service literature back to India with me in 1947," he said.

Shirole had completed 12 years of formal agricultural education and 4 years of soil conservation study prior to his training under Bennett. During his orientation to American soil conservation he visited several Southern and Midwestern States, working with a district conservationist about 6 weeks at each location before moving on. He said it gave him a good picture of agriculture and conservation practices.

"Climate and soils in northern India are similar to the southern United States," said Shirole, who worked in conservation throughout much of India. "Southern India has a lot of rocks and gullies." He explained that conservation needs in India are particularly critical, due to "4,000 years of erosion with little attention to conservation. The land has been neglected for so many centuries, you can't expect it to change overnight."

Shirole was intrigued by a display at the research center which showed the root system of a corn plant. He said Indian farmers would be amazed at the depths corn roots grow to here, because in many areas of India only a few inches of soil cover the bedrock. "The topsoil is completely washed off many of the hilly areas," he said.

During the monsoon season in India, it is not uncommon to get up to a foot of rain in 2 hours. Shirole said farmers rely on small dams and "percolation tanks"

to store excess water and "broad-based low bunds," an Indian version of terraces, to control runoff on slopes. "You can see some wonderful terracing in India," he said.

Shirole said the average farm in his country is about 10 acres and the typical farmer lives in town and commutes to his fields daily. Conservationists help the landowners develop "contour plans," he said. "They result from a give-and-take discussion with the farmer and fit the individual farm operation. Farmers don't want many terraces, and they don't want them very large because of the small farm size," he added.

Shirole explained that conservation systems in India are applied over an entire watershed. By law, if the owners of 60 percent of the land in a watershed want erosion control, the others are required to participate also. He described government funds for soil conservation in India as scarce, but said that the government pays one-third of the landowner's conservation treatment cost. Low-interest, 15-year loans are available for the rest. Farmers start paying the money back 1 year after they complete the conservation work.

There is no national soil conservation program in India, and Shirole said that not all States have programs. Each State administers soil conservation independently, and the programs focus on the major resource problems in each State. He said that many States are conducting soil surveys, a concept borrowed from the United States.

Mr. Gahm is public information officer, SCS, St. Paul, Minn.

More Ways Than One

Sullivan County, Tenn., is clearly pasture country. It has 100,000 acres of pasture and hayland, and less than 10,000 acres of row crops. Almost all the pasture acres lie on steep hillsides and the potential for soil erosion is high.

Because of the large amount of hilly grassland in the county and the erosion potential it presents, pasture renovation and conservation are top priority with the Sullivan County Soil Conservation District (SCD).

"In 1976 we decided that the main obstacle to pasture renovation in the county was the farmers' lack of suitable renovation equipment," said Carl Millsap, Soil Conservation Service soil conservation technician.

"So we sold the SCD's board of supervisors on the idea of purchasing a drill-type seeder and mounted spray rig. Farmers can rent the equipment from the district, and they can purchase improved varieties of seed and herbicides they need through the district."

Planting with the drill-type seeder leaves the soil virtually undisturbed and enables farmers to seed protein-rich, nitrogen-fixing legumes into sod in closely spaced rows.

The district's drill-type seeder has had a good workout in its more than 3 years of service. During February, March, and early April, which is the best time for seeding legumes into fescue in eastern Tennessee, there usually is a waiting list for the equipment.

"Farmer response has been tremendous," said James Ramsey, SCS district conservationist. "In the spring of 1978 we booked a lot more acres than we could handle, primarily because the long winter and wet spring had cut short the number of days we could use the equipment."

To get around the problem, instead of using the drill-type seeder, many Sullivan County farmers planted clover into fescue pastures by the spray-seed method. Because this method involves no tillage—just spraying in alternate bands with a contact herbicide and then broadcasting seed—it can be used when fields are too wet to plant with a drill. Farmers can kill 50 percent of the grass by spraying a contact herbicide in 4- to 10-inch bands. They can then broadcast seed the legume crop early in the growing season while moisture is plentiful. The spray-seed method of pasture renovation was developed by University of Tennessee researchers.

According to Joe D. Burns, Extension Service forage specialist at the University of Tennessee, demonstrations have shown that legumes will develop a vigorous stand in the bands where grass is killed, usually producing a pasture of roughly half grass, half clover.

Although most people in the beef and dairy business know that seeding clover into a grass pasture will increase both meat and milk production, little pasture renovation has been done. Some forage specialists think it is because renovation methods have seemed too costly and time consuming to bother with.

"Research promoting pasture renovation has been going on for the last 15 to 18 years," Burns said. "But it's just recently that we've come up with a really practical and simple chemical method of renovation."

Although the new method is commonly called the spray-seed technique, Burns has named it the "zebra" technique because of the brown stripes of dead grass it leaves in pastures until the clover comes up.

With spray seeding a farmer can renovate up to 100 acres a day using just a spray rig and a broadcast seeder. By mounting the broadcast seeder and herbicide applicator on a tractor, it becomes a once-over process.

The best months for renovation in eastern Tennessee are February and early March, because clover started early will be ready to graze sooner and will get through the summer months in much better shape. After mowing or grazing to remove excess pasture growth, Burns recommends testing the soil and applying the lime and fertilizer that the test indicates are needed. He recommends not using a nitrogen fertilizer because it will promote grass growth and delay clover establishment.

The next step is spraying. The contact herbicide should be applied in bands to 50 percent of the area of the pasture. Sprayed bands should be 4 to 10 inches wide and the same width as bands left unsprayed. In Sullivan County, renovation efforts have been most successful with an application of a contact herbicide sprayed in bands.

As soon as possible after spraying, simply broadcast the recommended clover seed mix onto the field and prevent grazing until there is adequate growth. After the new clover seedlings have reached their recommended grazing height of 4 to 6 inches, cattle may be allowed to graze the pasture. State Extension Service guidelines or other local sources should be consulted before choosing a seeding mix for a particular farm.

Other methods of pasture renovation have their benefits, but Burns can list many advantages to spray seeding. "In rocky fields you're not turning up more stone as you would if you used a disk,"

he said. "And spray seeding leaves the pasture smooth. Smooth pasture makes it easier to get in there and mow or use other equipment."

Spray seeding also does not disturb the soil on steep hillsides the way disking or other tillage methods does, thus reducing erosion.

"In a heavy stand of fescue, you need to get rid of half of it to give the clover a chance," Burns said. "With spray seeding, you put the remaining fescue in rows. We've found we can maintain the clover a lot longer where the fescue is contained in rows."

"We've also found that compared to disking, we get added growth and higher yield in the first few months with spray seeding. The disk rips up all the fescue and disturbs the grass it leaves growing. The contact herbicide kills half and doesn't touch the other half. Clover yield is about the same for the two methods, but the grass yield is higher with spray seeding."

"Spring of 1978 was the first year we did much spray seeding in Sullivan County," Ramsey said, "and the results were very promising. Also," he added, "you can cover a lot more acres in a lot less time than with a drill, and that's important both to busy full-time farmers and part-time farmers with limited time to spend in the field."

Carl Millsap added that equipment requirements for spray seeding are minimal. "If you have access to a spray rig and a tractor—a small one will do—you're in business. Especially on steep, rough, or rocky land, spray seeding is the way to get the job done."

Comparing the two techniques of spray seeding and drilling, Ramsey said, "You'll get more clover plants established per acre with spray seeding,

but you'll get faster germination and more vigorous young plants with a drill-type seeder."

Each method has its advantages and limitations, so farmers should pick the one that best suits their needs and the soil conditions. But, with either method a contact herbicide needs to be used to suppress the fescue and reduce the competition for legume seedlings.

"We've tried the drill-type seeder without using a contact herbicide," Ramsey said, "and the results weren't nearly as good. You need to suppress the grass competition; otherwise you could be just wasting seed and time."

"Although we've made good progress in renovating pastures in Sullivan County," Ramsey said, "we've got a long way to go. We've just scratched the surface of what can be done. Of our 100,000 acres of pasture, at least

50,000 could use renovation."

Ramsey said one reason he expects to see increased interest in pasture renovation from farmers is Public Law 92-500 and the Clean Water Act. The goal of the act is to make all lakes, streams, and rivers in the United States swimmable and fishable by 1983.

"By volume, soil sediment is the largest water pollutant we have in Tennessee," Ramsey said. Spray seeding to renovate pastures instead of disking protects the soil on steep grasslands by providing a protective cover of dead grass in the strips where clover is seeded.

Ms. Garlitz is assistant editor, *Soil Conservation*, SCS, Washington, D.C.



A farmer can mount a spray rig and broadcast seeder on a tractor and renovate as much as 100 acres of pasture a day in a once-over process.

SCS Programs Recruit Students

Introduction

The Soil Conservation Service is working hard to recruit minority students for employment in professional positions. New programs are springing up that tie into colleges and universities across the Nation. Richard A. Myers, chief of the Employment Branch at the national office, coordinates and develops these programs in cooperation with State and field office personnel. The programs include: student trainees, summer aids, and cooperative education for students in high school, 2-year colleges, 4-year colleges and universities, and graduate schools.

The various SCS student programs are designed for all students. Myers encourages the States to take advantage of these programs, however, to give more opportunities to minority students. The following articles give two examples of SCS programs in operation.

Reaching Out to High School Minority Students

For a number of years the Soil Conservation Service in Tennessee has worked closely with the Tennessee State University (TSU) School of Agriculture to increase employment of minorities. SCS has helped the TSU School of Agriculture improve its curriculum in order to meet SCS standards, and has recruited its students under a student trainee program. Through these joint efforts, the university has played an important role in supplying SCS with minorities for professional positions.

In 1977, SCS and TSU turned to a new source for recruiting: disadvantaged minority students at the high school level. Here was an opportunity to introduce students to the field of conservation of natural resources before entering college, and to spark their interest by offering them practical training at an SCS office.

The Summer Aid-Cooperative Education Program between TSU and SCS was established. This program is designed to hire disadvantaged minority high school graduates for summer jobs at an SCS office. In order to be eligible, the students must indicate that they are planning to attend TSU and major in agriculture, and are interested in careers with SCS. The students must also agree to work in a different State with SCS under the cooperative education program after they complete their freshman year at TSU. Under the summer aid-co-op program, the students work in the field with soil conservationists and learn the principles of conservation practices.

This program is beneficial to the TSU School of Agriculture in helping it reach disadvantaged minority students. The SCS program provides these students

with some means to continue their education beyond the high school level, and benefits SCS by assisting it in placing high potential minority employees in States that have a difficult time in hiring minorities.

Graduate Students Become SCS Interns

Jackson State University in Jackson, Miss., has begun a graduate internship program with the Soil Conservation Service. This program, authorized in the summer of 1978, marks the first time SCS has established a cooperative education program at the graduate level. The program allows for graduate students enrolled in the school's Master of Public Policy Administration Program (MPPA) to work full time at an SCS office. Jackson State was chosen for the inaugural program because of the initiative of MPPA internship director, James Harvey, who is credited with establishing a relationship with SCS. At present, the internship program is being used as a means for increasing employment of minorities.

During a work period totaling at least 13 weeks at SCS, the graduate student receives on-the-job training in one of the administrative areas of either personnel, budget, or contracting and procurement. The student must complete the internship and turn in a report in order to earn the three credit hours allowed for the program. This internship program acts as a preliminary step to the SCS administrative trainee program. Upon receipt of his or her master's degree, the intern may be offered a permanent position in the trainee program if a position is available and he or she has performed the work at SCS satisfactorily.

Meetings:

September

5-7	American Water Works Association, Chesapeake Section, Ocean City, Md.
9-12	International Association of Fish and Wildlife Agencies, West Yellowstone, Mont.
12-14	American Fisheries Society, West Yellowstone, Mont.
24-28	Federal Bar Association, San Antonio, Tex.
25-28	National Conference of Editorial Writers, Phoenix, Ariz.
26-30	The American Horticultural Society, Palm Beach, Fla.
30-Oct. 3	Farm and Industrial Equipment Institute, San Francisco, Calif.
30-Oct. 4	National Association County Agricultural Agents, Rapid City, S. Dak.

October

3-7	American Horticultural Society, Portland, Oreg.
7-12	Water Pollution Control Federation, Houston, Tex.
10-12	Hardwood Plywood Manufacturers Association, Los Angeles, Calif.
12-18	American Association of State Highway and Transportation Officials, Hartford, Conn.
13-17	American Society of Planning Officials, Baltimore, Md.
14-17	Society of American Foresters, Boston, Mass.
16-18	Agricultural Research Institute, Washington, D.C.
20-25	National Environmental Sanitation & Maintenance Educational Conference/Exposition, Clearwater Beach, Fla.
22-26	American Society of Civil Engineers, Atlanta, Ga.
25-28	National Association of Biology Teachers, Inc., New Orleans, La.
28-31	American Forestry Association, Charleston, S.C.
28-Nov. 1	Congress for Recreation and Parks, New Orleans, La.
31-Nov. 4	The American Society of Landscape Architects, New Orleans, La.

November

4-7	The Irrigation Association, Marco Island, Fla.
5-8	The Geological Society of America, San Diego, Calif.
5-9	National Adult Education Association, Boston, Mass.
7-9	Future Farmers of America, Kansas City, Mo.
11-14	National Agricultural Bankers, Salt Lake City, Utah
11-14	National Association of State Universities and Land Grant Colleges, Washington, D.C.
11-14	National Forest Products Association, Palm Springs, Calif.
12-20	The National Grange, Lancaster, Pa.

The first student selected for an internship with SCS was Lydia Louie, who was recommended by James Harvey because of her ability to work well with people. Louie works in the Mississippi State office as a personnel management specialist under the supervision of Personnel Officer Henry Shaw. Shaw is primarily concerned that Louie be provided with an orientation to the policy and programs of SCS, and to personnel procedures in the government. Louie works on assignments in merit promotion, position classification, and appointment authorities, and accompanies Shaw to personnel meetings and presentations. Working full time during the day and taking two courses a week in the evening, Lydia Louie will complete the internship and receive her master's degree in December 1979, at which time she can be considered for a permanent position with SCS.

The graduate internship cooperative education program between Jackson State University and SCS is mutually beneficial. The graduate students get exposure to and practical experience at a Federal agency, while SCS is provided with a new source for recruiting in the administrative field.

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Soil Conservation

October 1979

U.S. Department of Agriculture

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Targeting Our Assistance

From the Administrator

Constraints of time, money, and energy make it imperative that the Soil Conservation Service and conservation districts *target* their assistance to the places and people with the greatest need.

An important result can be *better* programs, more closely coordinated with other programs and agencies.

In the past year, SCS has had a chance to blend a number of strategies to achieve a "total approach" for an area or project:

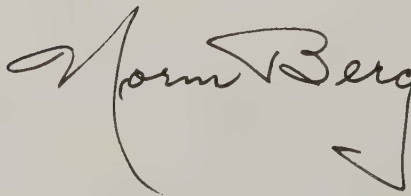
- In Western Tennessee, the joint State-Federal plan to combine critical soil erosion in 21 counties where soil losses are four times the national average (or more!);
- In the Rural Abandoned Mine Program, the first-priority work to protect public health, safety, welfare, and property from extreme danger caused by past coal mining. SCS in Pennsylvania is encouraging other State and Federal agencies to look at reclamation on an entire watershed rather than scattering individual assistance;
- In the Great Lakes Basin, United States and Canadian agencies and organizations focusing their assistance on parts of watersheds (hydrologically active areas) where land-use practices or resource conditions are degrading water quality in the basin most. Soil erosion rates are not necessarily the key factor;
- In the small watershed program, local sponsors and SCS striving to get more land treatment installed or scheduled on critically eroding areas before starting to build structures.

There is growing demand for clear targets and criteria with which we can evaluate and predict the performance of many conservation programs. The Soil and Water Resources Conservation Act is providing those checkpoints. Some also may come from other sectors of the government or society, yet we can make a strong contribution.

One important national goal or priority is energy conservation. SCS and district programs can aid significantly as part of areawide efforts to reduce energy use through improved farming and ranching methods, water conservation, and erosion and sediment control.

The need was never greater for innovative ideas in targeting our assistance still further to advance proper use and care of natural resources with the least possible input of financial and human resources.

Our aim must be to improve our conservation aim.

A handwritten signature in black ink, reading "Norm Berg". The signature is stylized, with a large, sweeping "N" and a long, curved line extending from the end of the name.

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Soil Conservation

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Front cover:

Conservation practices like these terraces installed through the Maple Creek Model Implementation Project on the Robert Travnicek farm near Clarkson, Nebr., saved an estimated 20,000 tons of soil in 1978. (See article beginning on page 8.)

Back cover:

In Mississippi, Humphreys County is leading the State in catfish production. Fish farming is proving to be a valuable alternative to growing crops. (See article beginning on page 16.)

Drying Up Barnyards

Clean Water Models

In September 1977, the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA) joined in an agreement to concentrate on solving nonpoint source pollution in selected areas of the country.

In January 1978, USDA and EPA chose seven areas affected by nonpoint source pollution as Model Implementation Projects (MIP's). They are in Indiana, Nebraska, New York, Oklahoma, South Carolina, South Dakota, and Washington.

The MIP's are a 3-year test to demonstrate how a concentrated effort of cost sharing and technical assistance by USDA and EPA can help solve agriculture-related water quality problems.

The Soil Conservation Service and the Agricultural Stabilization and Conservation Service (ASCS) of USDA and EPA have the lead role in the MIP's. SCS assigned additional personnel to each MIP area. ASCS obligated \$1.27 million of Agriculture Conservation Program funds. And EPA made about \$1.5 million available for monitoring and evaluation during 1978.

Support from USDA's Science and Education Administration, Farmers Home Administration, Forest Service, and Economics, Statistics, and Cooperatives Service has been excellent. Local and State agencies' support in the MIP's has been outstanding.

The MIP areas range from 24,000 to 287,000 acres. The projects are scheduled to run for 3 years. The MIP areas will receive an average of \$200,000 in cost-share assistance per year for 3 years. Cost-share rates vary from 50 to 90 percent.

This is the first part of a three-part series on each of the seven MIP's. The New York, Nebraska, and Oklahoma MIP's are described here. Articles on the Indiana, South Carolina, South Dakota, and Washington MIP's will appear in subsequent issues of *Soil Conservation*.

by Pat Paul

Barnyards in Delaware County, N.Y., are drying up—a fact which pleases farmers, helps the cows, cleans up the water, and meets with the approval of local residents. The dry barnyards are the result of a joint U.S. Department of Agriculture and U.S. Environmental Protection Agency program to complete seven Model Implementation Projects (MIP's) for improving water quality.

Soil Conservation Service State Conservationist Robert Hilliard in Syracuse said, "The MIP here is a big success. The project had specific goals and the farmers had specific problems. Through the MIP we met both needs."

"There was some confusion and concern when farmers first learned of the project," said Milt Thomson, chairperson of the Delaware County Soil and Water Conservation District (SWCD). "Some people were concerned that efforts to improve water quality would lead to increased land use controls. But after checking out the objective of the MIP, Bob Miller, president of the Delaware County Farm Bureau, urged farmers to participate in the program."

"The Delaware County SWCD and the local Agricultural Stabilization and Conservation Service (ASCS) committee decided to sponsor the project for several reasons," said Thomson. "Many people blamed farming for the increasing algae growth in the Cannonsville Reservoir, a major New York City water supply. Also, one of the goals of the MIP was to learn more about existing water quality problems in the watershed. Besides helping farmers voluntarily apply effective measures to control agricultural nonpoint source pollution, the project could also help eliminate the need for regulations to control this type of pollution."

"But the main reason for sponsoring the MIP was to help improve the economic base for farm operations in Delaware County by providing cost-share incentives," said Thomson.

In 1978, the watershed of the West Branch of the Delaware River was approved as one of the seven MIP's nationwide. Located in the southeastern part of the State, the watershed covers 287,000 acres and takes in 275 dairy farms. Dairy farming is the single largest industry in the area. There is also a meat packing plant, a milk processing plant, and a hubcap manufacturing plant. The population of the area is 17,000.

Because of the size of the watershed, the MIP advisory group had to select high priority areas needing critical water quality treatment. The advisory group used a study prepared by SCS on nonpoint source water pollution in the West

Branch along with other information in setting priorities for the MIP work.

Water monitoring samples taken in 1977 by the New York City Board of Water Supply showed high levels of phosphorus in four tributaries at the upper end of the watershed. According to a study by USDA's Economics, Statistics, and Cooperatives Service at Cornell University, three-quarters of the barnyards in the area are located within 200 feet of a stream. The advisory group decided to begin MIP efforts on the four tributaries.

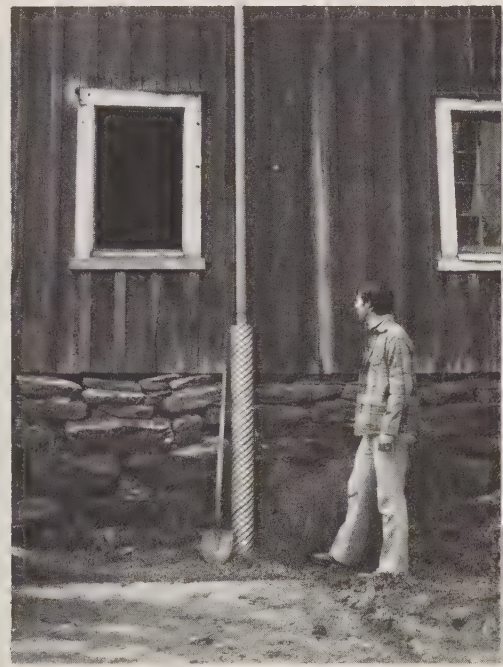
ASCS provided \$325,000 in special project funds to assist in the installation of practices designed to reduce pollution from probably the three biggest contributors to phosphorus loadings—barnyard runoff, manure spreading and storage, and milkhouse waste disposal. The MIP advisory group agreed to provide 90-percent cost sharing for certain practices with a limit of \$2,500 per farmer for the first year. This was increased to \$3,500 the second year.

In March 1978, USDA's Science and Education Administration-Extension invited all the farmers from the West Branch area to the first MIP public meeting at the Bloomville firehall. "More than half of the invited farmers came to the first meeting," said SCS District Conservationist Richard Lewis. ASCS representatives explained how the cost-share program would work. SCS explained how a conservation plan would be developed for each farm to provide for low-cost, efficient pollution control practices as part of good farm management. Needed practices would be installed under 3-year contracts. The planning emphasized animal waste management but also included erosion and sediment control.

Six different studies of the Cannonsville Reservoir had identified phosphorus as the main water quality problem. "Barnyards were the number one priority," said Lewis. A Cornell University study of the Fall Creek watershed near Ithaca, N.Y., had indicated that in the case of dissolved



To keep cows out of a stream that cuts his farm in half, Allan Weinmann installed a 36-inch culvert with cost-sharing assistance available through the MIP program.



SCS District Conservationist Richard Lewis inspects a tile line that diverts roof water away from a barnyard.

phosphorus, the most cost effective way to reduce phosphorus from agricultural sources was by controlling barnyard runoff.

"While many farmers might recognize water quality problems associated with barnyard runoff, the challenge is to convince them of the need to install effective but sometimes costly control measures," noted Lewis. "I honestly don't think we could have persuaded some of them based on the need to improve water quality alone. We had to show them the benefits to their farm operation.

"For example, some farmers felt that by improving barnyard conditions, they would be able to improve herd health, reduce hoof disease, and reduce sediment in the milk. Some badly mired barnyards were not only a nuisance to farmers, but also took time and labor away from other farm operations for periodic cleanups.

"By talking about the total concept of barnyard management, we attracted farmers who had never before partici-

pated in the soil and water conservation program. It must have been the right approach because, during the first 3 months, 92 farmers—about a third of those in the watershed—signed up for the program."

"The MIP provided a whole new direction," said ASCS Director George Komer. "Cost sharing had long been used for manure storage structures and other similar measures, but the MIP called for innovative practices to control barnyard runoff and milkhouse waste that were not covered by the Agricultural Conservation Program. For the first time, funds were used to cost share temporary manure storage, filter strips, and gutters and downspouts on barns. Now, the practices are part of the statewide program."

"We could have attacked the problem of controlling barnyard runoff in two ways," said Lewis. "One way was to collect the polluted runoff water as it left the barnyard and either put it in a holding pond for later disposal or direct it to a safe disposal area. But this method had no benefit for the farmer.

"The method we decided to use was keeping clean runoff water out of the barnyard area, thus drying up the barnyards. Keeping barnyards dry was a significant selling point in seeking voluntary participation by farmers. Solving the water quality problem was also part of meeting the farmers' needs."

The Burns brothers' farm in the West Branch area is a good example of the MIP's success in controlling barnyard runoff. The Burns' barnyard is within 100 feet of a protected trout stream and runoff from the hillside above the barn traveled across the barnyard and into the stream. There were also problems with the concrete pushoff dock in front of the barn. The Burns have a free-stall operation which means the stall area is cleaned by scraping the manure off the concrete dock and into a manure spreader. Manure that missed the spreader accumulated at the base of the dock. During peak runoff times, the accumulated manure was carried into the stream.

To solve the problem, SCS provided technical assistance in building a diversion ditch around the barnyard to catch clean surface water and water that runs off the roof and carry it to the stream. A culvert was put into the diversion ditch for a livestock crossing and a 1-foot high concrete lip was added to the existing concrete pad to keep manure from running off the pad.

Allan Weinmann, another West Branch area farmer, re-



A drop inlet on a West Branch area farm catches surface water before it runs across the barnyard. Richard Lewis, SCS district conservationist, examines the steel grate over the inlet.

ceived MIP cost sharing and technical assistance for installing a culvert in the stream on his farm to keep the cows from wading through the stream when they headed for the pasture. After the culvert was in, Weinmann had his cows' milk tested at the creamery. The creamery determined there was less sediment in the milk.

Seeps from springs on the Don Ackerly farm had made his barnyard wet and muddy much of the year. Through the MIP the barnyard was graded, shaped, and graveled. A stone inlet and tile line were installed to catch surface water and water from the springs and divert it from the barnyard. Ackerly said that the drier barnyard has helped reduce hoof disease in his herd.

Besides wet barnyards, another problem throughout the watershed is the disposal of milkhouse waste. Soils in the area are dense and compact permitting little infiltration of water, thus they are unsuited for septic systems and filter fields for milkhouse waste. On many farms, milkhouse waste is run through a pipe and outletted in the barnyard or directly into a stream. Milkhouse waste treatment lagoons are one solution. But for less critical milkhouse waste problems, Sanitary Engineer Jim Krider from the SCS Northeast Technical Service Center recommended the use of filter strips. SCS has developed new standards and specifications for using filter strips for milkhouse waste. In most cases, the cost for filter strips is less than for milkhouse waste treatment lagoons.

Manure spreading and storage also contribute to water pollution in the West Branch area. About 43 percent of the cropland in the watershed is on slopes of more than 8 percent. Winter spreading of manure is necessary for many farmers, but it is difficult to spread the manure properly because of weather conditions. Various alternatives to winter spreading were considered. Expensive long-term storage of manure may be needed, depending on herd size and farm management needs. In most cases, though, temporary stockpiling of manure during the worst weather is sufficient. A new SCS standard and specification for waste field storage was developed for stockpiling manure for 60 days or less. It involves regrading an area of a field to allow for stockpiling. Surface water is diverted around the site to keep runoff from entering the storage area. More than one site may be needed on some farms.

Conservation practices to control runoff have traditionally been used to reduce erosion. Many of these same practices

can benefit water quality by reducing runoff which carries sediment, nutrients, and chemicals into streams and lakes.

"Because we don't know yet if it is dissolved phosphorus or phosphorus attached to soil particles which is causing the eutrophication problem in the Cannonsville Reservoir, we are trying to address both problems in the MIP," said Lewis. "Some water quality experts say dissolved phosphorus from animal waste is more significant than phosphorus attached to soil particles in terms of water quality."

To estimate how much of the MIP cost-sharing money is actually being spent for practices to improve water quality, SCS State Resource Conservationist in New York, Lloyd Wright, developed a water quality budget process. Percentages were assigned to the conservation practices installed to improve water quality in various circumstances. For example, 25 percent of the cost of a diversion ditch on a cropland field is designated as benefiting water quality, whereas 100 percent of the cost for a diversion ditch above a barnyard is allocated to water quality improvement. This evaluation tool will help quantify the overall cost and effects for conservation practices to improve water quality in the West Branch area watershed.

The MIP convinced people that a voluntary approach to improving water quality, using existing conservation programs and supported by strong interagency cooperation, would be well accepted by the farm community. The key to success in controlling barnyard runoff in the project has been finding and using measures which have direct benefit to the farmer as well as offsite water quality improvement benefits.

"Everyone thinks we just apply practices," Lewis said. "The important questions we have to answer are what practices are needed, how do we get farmers to participate, and how do we have a positive effect on both agriculture and water quality? We are here because this is basically an agricultural area. We have to help the farmer stay in business while protecting soil and water resources."

Ms. Paul is public information officer, SCS, Syracuse, N.Y.

Cleaning Up the Creek

by James C. Gonsior

"I used to lay out my own contouring, but it didn't always come out the way I wanted. The fields either ended up washing out or silting in," said Robert Travnicek, a farmer in the Maple Creek watershed near Clarkson, Nebr.

"Now it'll actually be easier to farm than before. I believe in terraces and the Model Implementation Project (MIP) was a good opportunity to install terraces on some of my land," he said.

Through the MIP, terraces and other conservation practices have become a reality for many farmers in the 150,000-acre Maple Creek watershed in east-central Nebraska. The watershed includes parts of Stanton, Colfax, and Platte Counties. Being selected as an MIP meant \$275,000 in cost-sharing funds available each year of the project in addition to the regular Agricultural Conservation Program (ACP) allotment.

"This area, historically, has had little conservation applied to the land," said Gene Phillips, Soil Conservation Service district conservationist in Stanton County. "We estimate that

15 to 20 tons of soil per year are eroded from every acre in the watershed.

"There is an abundance of deep silty clay loam soils in the watershed, so the erosion usually did not decrease crop yields. People simply did not have an economic incentive to apply conservation."

Most of the Maple Creek MIP area is Class III and IV land. The topography is characterized by steep hills with irregular short slope lengths of 100 to 500 feet.

According to a U.S. Department of Agriculture survey of 172 land units in the Maple Creek watershed, only 2 percent of the tenants and none of the landowners would admit to erosion problems, while an SCS survey determined that 82 percent of the farms in the area had major soil erosion problems.

"But the MIP has helped change some of the attitudes toward conservation in the area," said Ed Harms, SCS district conservationist in Platte County. "Previously, conservation was socially unacceptable and many farmers who applied



In Nebraska, Dennis Kabes installed 15,000 feet of pushup terraces on his farm to improve water quality in the Maple Creek watershed. He received cost-share assistance in installing the terraces through the Maple Creek Model Implementation Project.

land treatment were ridiculed by their neighbors.

"The cost-sharing money has been the key selling point. Funds from the ACP and the Lower Elkhorn Natural Resources District (NRD) are providing 90 percent and higher cost sharing."

The Lower Elkhorn NRD has created a "Lands for Conservation Program" for farmers in the MIP area. The program provides \$40 per acre to farmers for up to 60 acres if they install conservation practices in June, July, or August.

"In the Maple Creek MIP, farmers usually put off any land improvement work until after fall harvest," said Harms. "Under the NRD's program, a farmer can harvest oats in July, have the conservation work installed in August, and collect the added money."

"The district also provides 90 percent cost sharing for projects that exceed the ACP cost-sharing limitation," said Phillips. "So far that has amounted to about \$325,000 for cost-share practices above the \$275,000 available through ACP."

"I've always wanted to do some conservation on my fields," said Dean Teply of Clarkson about his new dam and 5,000 feet of parallel pushup terraces. "I want to keep my soil and water here. I don't want to see it going to Louisiana."

"The cost-share program of the MIP was my main incentive. I couldn't have afforded to do all this myself."

Dennis Kabes, a local farmer, who applied 15,000 feet of terraces in 1978 is planning on doing more. "The cost-share money is now available to apply conservation and I don't want my soil washed into the creek," Kabes said.

In 1978 the MIP program had a good year even though the project didn't get underway until April when most farmers had their crops planned. There were more than 13 miles of terraces, 1,200 acres of conservation tillage, 15 acres of grassed waterways, 8 ponds, and 20 acres of pasture planting installed.

"There was more visible conservation installed in the MIP area last year than there had been in the previous 7 years," said Phillips.

"According to our calculations, more than 20,000 tons of soil was saved in 1978," said Phillips. "The soil was held on the hills and kept out of the creeks and streams."

"The three county Agricultural Stabilization and Conservation Service committees have also chosen to cost share with farmers who practice conservation tillage. Depending on the amount of residue, farmers can receive \$6 or

\$12 per acre on an individual field or on their entire farm," said Phillips.

Estimated treatment needs in the Maple Creek MIP are: 600 miles of terraces; 22,000 acres of conservation tillage; 600 acres of grassed waterways; and 60 erosion and sediment control dams.

"In addition to the land treatment being applied under the MIP, USDA's Science and Education Administration (SEA) has installed water quality monitoring stations at key sites. From the study, researchers will be able to develop design criteria for sediment basins to control losses and pollution of runoff on row-cropped land with steep slopes and irregular topography. They will also be able to provide designs to reduce energy requirements both for farming and construction as an alternative to, or in addition to, terraces."

Landowners are kept informed on the MIP developments by the Cooperative Extension Service through public information efforts. Extension Service people have held public meetings to explain the project and programs available to the farmers. A special quarterly MIP newsletter is also sent to the 172 landowners in the area.

To help make personal contacts, and plan and layout the conservation practices, SCS assigned an additional soil conservationist and conservation technician to the Maple Creek MIP area.

"In the beginning, most people involved in the project were concerned over what would happen when the MIP was fully initiated. Most of us have been pleasantly surprised," said Phillips.

So far in 1979, conservation tillage has been used on an additional 5,700 acres. Nine ponds have been installed and three more are planned. Terraces have been installed on 3 farms, and 23 farmers are waiting to have terraces put in after their crops are harvested.

"We are expecting an even better year in 1980," said Phillips. "We already have 24 terraces and sediment water control systems, 12 small dams, and 2 animal waste facilities among the practices to be installed."

"The Maple Creek MIP proves that conservation will be applied if incentives are provided to the landowners. It also shows that Federal and State agencies can cooperate for the overall improvement of water quality."

Mr. Gonsior is district conservationist, SCS, Schuyler, Nebr.

Keeping Soil from Washing Down the Washita

by F. Dwain Phillips

Easily eroded soils, highly variable rainfall, and the resulting sediment deposited in streams made the Little Washita River watershed in south-central Oklahoma a candidate for the Model Implementation Project (MIP) program. In 1978, it was selected as one of seven MIP's in the Nation.

The MIP program is the result of an agreement between the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA) to concentrate efforts on providing technical and financial assistance for improving water quality in selected watersheds. Conservation work will be aimed at solving nonpoint source pollution problems.

The Little Washita watershed includes parts of three counties—Grady, Comanche, and Caddo—and encompasses 154,270 acres. More than 75 percent of the area is used for range and pastureland. About 20 percent is used for cropland, and the rest is in roads and other uses.

To carry out the MIP objectives, the Soil Conservation Service and local conservation districts made a detailed inventory delineating all major use areas in the watershed and isolating potential factors affecting water quality.

The inventory showed about 15,000 acres needing revegetation, more than 3,500 acres needing critical area treatment, and almost 3,000 acres needing terracing. The inventory also showed about 1,400 acres of roadside erosion.

SCS assessed the nonpoint source pollution problem in the watershed and recommended the most effective and practical conservation practices for controlling it. The best management practices (BMP's) that SCS recommended included critical area treatment, revegetation, terracing, conservation tillage, grassed waterways, animal waste management systems, deferred grazing, erosion control structures, and protection of stream corridors.

Gullying and the sedimentation it causes are the two major nonpoint sources of water pollution in the watershed. The sandy loam soils are highly susceptible to erosion when not adequately protected by vegetative cover, and gullies are common on pastureland and rangeland. Critical area treatment for gullies in the MIP includes shaping and sprigging bermudagrass. But in severely eroded areas where shaping is not feasible, black locust trees are planted to reduce erosion. Multiflora rose shrubs are also planted in these areas to provide food and cover for wildlife.

To help landowners install conservation practices, SCS is providing technical assistance through the conservation districts. An additional soil conservationist was assigned to

each of the SCS field offices serving the MIP area to provide accelerated assistance to landowners.

SCS provides financial assistance in installing BMP's through the Great Plains Conservation Program (GPCP), the Resources Conservation and Development Program, and the flood prevention and critical area treatment programs under the Flood Control Act of 1944 (Public Law 534). The Little Washita watershed is the only MIP area eligible for GPCP or Public Law 534 funds under SCS-administered cost-share programs as well as for cost sharing provided through the Agricultural Conservation Program administered by the Agricultural Stabilization and Conservation Service (ASCS). Cost-share rates vary from 50 to 90 percent of cost.

To measure how the applied practices affect water quality, the Science and Education Administration (SEA) will use two major monitoring stations. One is at the lower end of the Little Washita River and one is at the midway point. The stations will sample total flow, bedload, suspended solids, and contamination by pesticides and fertilizer.



Loren Heavin, Science and Education Administration engineering technician, works on a water quality monitoring station in the Little Washita River watershed.

At 24 SEA surface water sampling sites, water will be sampled four times a year to monitor changes in chemical composition. SEA has also set up five unit source watersheds through which the amount of sediment washing off treated areas will be compared to the amount washing off untreated areas. For example, the amount of sediment washing off a gullied area that has been shaped and vegetated will be compared to the amount washing off an untreated, gullied area with slope, soil type, and other conditions being similar.

Two detention reservoirs will be monitored to provide information on the effect flood retarding structures have on water quality by sampling the inflow and outflow. Twelve rain gages throughout the watershed measure the amount and intensity of rainfall while the chemical composition, temperature, relative humidity, and pan evaporation of rainfall are monitored at climatic stations.

At each unit source watershed there will also be a rain gage to measure the amount of rainfall and its nutrient com-

position. Twenty-six ground water wells are being monitored to check the chemical composition of the water and changes in water level in underground water tables.

SCS, ASCS, SEA, and the Farmers' Home Administration, all agencies of USDA, are cooperating in the project along with EPA and the U.S. Department of the Interior. The Oklahoma Conservation Commission, the Oklahoma Department of Pollution Control, county commissioners, and other State and local agencies are also involved in the MIP.

At the end of the 3-year MIP period, USDA and EPA will have valuable information on how effective different conservation practices are in reducing the amount of nonpoint source pollution entering the streams in the Little Washita River watershed. The information will be used in reducing sediment loads in streams and rivers throughout the State and the Nation.

Mr. Phillips is public information officer, SCS, Stillwater, Okla.



Science and Education Administration Agricultural Engineer Edd Rhoades prepares equipment for setting grade stakes in installing a monitoring station that will test the effect a flood control structure has on water quality.

Farm ponds, stripcropping, and other conservation practices help provide food and cover for many kinds of wildlife.





Farmers and Ranchers as Wildlife Managers

Reprinted from *Fish and Wildlife News*, published by the Fish and Wildlife Service, U.S. Department of the Interior, February 1979.

by R. M. Davis

The same people who produce America's food and fiber also have a serious commitment to protecting and enhancing wildlife habitat.

That is good news because the non-Federal land that they own or manage makes up 1.3 billion acres—more than half of the land in the United States. The total is about equally divided among cropland, forest land, and pasture and rangeland. All of it plays a significant role in achieving and maintaining a variety of suitable fish and wildlife habitat.

Certain kinds of wildlife live *only* on—or in association with—land that is used for growing cultivated crops or for producing livestock or timber. Many species are affected by the way farmers and ranchers go about their agricultural role. Those effects can be favorable ones, if:

- Farmers and ranchers view all of their natural resources as an interdependent whole; and
- Wildlife management is designed to fit the land and successfully integrated with its primary use.

In blending agriculture and wildlife concerns, farmers and ranchers can be aided greatly by State and Federal fish and wildlife agencies, by the Soil Conservation Service, and by the programs of local soil and water conservation districts. Fish and wildlife habitat management, as it can be accomplished through programs of land use and conservation treatment, is an important phase of district programs.

As farmers and ranchers plan and apply soil and water conservation, they often are receptive to suggestions for practices that can help wildlife and fish. Most will try to fit these practices into their conservation plan.

More than a hundred SCS biologists

assist with complex fish and wildlife management problems on private lands, and train the SCS district conservationists in nearly every county in providing aid with routine wildlife habitat management.

Many conservation practices that protect soil and water resources and sustain crop yields also provide elements of wildlife habitat. Stripcropping, farm ponds, windbreaks, tree planting, range seeding, and many other practices are examples. They help make good habitat for wild creatures if they are properly designed, constructed, and used. More and more landowners are working through conservation districts to achieve a combination of practices that will fill the gap between conservation for production of food and fiber and conservation for acceptable wildlife habitat.

Landowners have installed more than 2 million farm ponds, which provide fish habitat and an element of wildlife habitat more valuable than some comparable acreages of woodland, cropland, or grassland. Within the pond itself and the surrounding area, the water and growth of natural and planted vegetation can provide food, cover, and water for a number of wildlife species.

Some farmers and ranchers decide to manage their ponds to provide an important cash crop—"fish farming." SCS aids them in basic resource appraisal, biological concerns in fish production, waste disposal, and design and layout of water management systems. Fish farming and other forms of aquaculture will be receiving a great deal more attention in future years.

The ultimate goal of farmers and ranchers is to make a living. Most wildlife habitat on farms and ranches does not

represent income to the landowner. Thus, it is difficult for fish and wildlife habitat to compete in the marketplace with food, fiber, and wood products.

Nonetheless, landowners in 1977 performed wildlife habitat management on more than 610,000 acres of wetlands, because they recognize that their decisions do significantly affect the abundance or scarcity of habitat or because they just happen to enjoy wildlife.

Wetlands in private ownership provide valuable wintering, migrating, and breeding habitat for waterfowl, as well as habitat for many other species of fish and wildlife.

One important way in which farmers and ranchers voluntarily preserve wetlands and develop high-quality wildlife habitat is through the U.S. Department of Agriculture's Water Bank Program. Landowners in more than a dozen States where waterfowl areas are most vital preserve wetlands and take other nearby acres out of farming in return for payments and technical help in improving the wetlands and adjacent areas.

The agencies involved are working hard to cut the red tape, to encourage more landowners to participate, and to stress added benefits such as habitat for other species of fish and wildlife, flood prevention, ground water recharge, and water pollution control.

Another way in which many farmers and ranchers are involved is in the more than 4,000 recreation or fish and wildlife developments that are active at any one time in multicounty Resource Conservation and Development (RC&D) areas. For example, in five counties in northeastern Pennsylvania, local RC&D sponsors are working with SCS and the Pennsylvania Game Commission to enhance existing low quality wetlands and

to create more wetlands for waterfowl populations along the Susquehanna flyway.

From 30,000 to 100,000 puddle ducks, 26,000 to 75,000 diving ducks, and 75,000 to 150,000 geese cross that part of Pennsylvania during their fall migration. Yet less than 1 percent stop or remain in Pennsylvania for any length of time.

Through the RC&D effort, 16 waterfowl impoundments, 18 acres of food plots, and 8,000 feet of maintenance access road are being installed on six State game lands. The work should be completed in 1981.

Similar recreation or fish and wildlife developments may be a part of small watershed projects, too, either as an added purpose of the projects beyond flood prevention or as a means of compensating for habitat that may be adversely affected by structural measures in the project. The results have been encouraging for farmers and ranchers, their communities, and the agencies that assist them.

Thanks to closer cooperation with the Fish and Wildlife Service in a set of guidelines for stream channel modification, watershed projects are doing a better job of moving water safely.

We will continue the job of working out some disagreements, correcting some interpretations, reviewing the effects of compromises already reflected in the guidelines, and weighing whether the guidelines should become binding regulations. Together we are using a standard format for helping local people and agencies resolve channel modification issues and decisions in watershed projects.

I think that when people of various agencies meet together in specific proj-

ects and blend their concerns and ideas with those of the people on the land, it is a very positive step toward better projects, better teamwork for the future, and a fuller response to President Carter's directives on channel modification and other issues.

Another improvement in watershed projects is an effort to speed the accomplishment of conservation land treatment—increasing the amount applied before structural measures can be installed, and working to design future projects in which watershed aims of the local people can be met with fewer structures.

Farmers and ranchers and their communities also can do a better job in making decisions about wetlands and other resource questions related to fish and wildlife if they can get reliable information about wetland sites, characteristics, and conditions with a minimum of duplication or conflict.

SCS has appreciated the good exchange of ideas among Fish and Wildlife Service employees and our soil scientists and other specialists in the National Wetland Inventory. We are helping each other build into the inventory system more information about values, impacts, and tradeoffs with more understanding of the technical aspects of soil, vegetation, species, and other components.

We are helping each other improve the compatibility of wetland inventories with studies of prime, unique, and other important farmlands. Pressures for urban development affect wetlands and good farmland. Over the next 3 years more than a third of the counties in the United States will be anxious to have maps that show information about farmland and wetlands.

Agencies of Interior and Agriculture are working in several other ways, especially under a recent "four-way agreement," to share the load in gathering, interpreting, and delivering information to people who can use it on the land.

Farmers and ranchers and other people have their own information to "deliver" about natural resource concerns, including fish and wildlife habitat. Nearly 160,000 citizens discussed their concern at public meetings this past year under the Soil and Water Resources Conservation Act. Their ideas, and the ideas of interested organizations and agencies expressed at the meetings or in letters, will help all of us keep track of changes or trends in wetland acreage or condition—and sharpen public policies while encouraging private land-use decisions.

We all want the kind of land-use and management decisions that preserve the resource base and are responsive to the needs of the American people. We all want to help local and State governments and individual farmers and ranchers meet their needs for growth and development; protect the natural environment; assure adequate supplies of high quality food, fiber, wood, and water; and protect and aid fish and wildlife.

In their effort to make a living, and insure a place for wildlife, farmers and ranchers will continue to appreciate support from and close teamwork among all the public agencies that have ideas to share.

Mr. Davis was administrator,
SCS, Washington, D.C.



Above, wetlands provide high quality wildlife habitat. Farmers and ranchers are preserving areas of wetlands on their property through USDA's Water Bank Program. At left, windbreaks protect cropland and provide food and cover for wildlife.

Aquaculture: The Farming Alternative

by Billy M. Teels

Aquaculture is the controlled raising of useful animals and plants in confined water environments. Its goals range from producing a protein food, to improving natural stocks through breeding, to supplying sport fish, bait, and ornamental plants and animals.

As a promising and reliable food source, aquaculture has caught the attention of scientists, policymakers, and landowners worldwide. Fish generally provide more nutrition per unit weight than red meats, along with greater amounts of calcium and other

minerals, and has unsaturated, low cholesterol fat. Some advantages of aquaculture over husbandry of other animals include more efficient use of fertilizers and feeds, higher yields per area, and lower production costs.

A major advantage of aquaculture is that it complements rather than competes with agriculture for land and water use. Aquaculture broadens areas for food production because it may be developed on lands ill-suited for crops: for instance, in sloping valleys between hills; inland swamps,

Catfish Capital of the World

by Don Templeton



Catfish production is booming in Humphreys County, Miss. SCS has assisted county landowners with fish farming operations since the first was installed in 1965.

In a State that is the Nation's leading producer of farm-raised catfish, Humphreys County, Miss., is foremost. Humphreys County catfish farmers are proud of the quality of their ponds, most of which have been constructed with Soil Conservation Service technical assistance, provided through the local soil and water conservation district.

SCS assistance to Humphreys County, primarily with water management systems, consists of selecting the best pond sites and planning pond layout. This includes checking the soil texture and determining the number and size of the ponds and levees and the location of wells and drains. SCS also advises farmers on such practices as grading pond bottoms to permit drainage and facilitate row cropping, should they later decide to take the pond out of production.

Once established, a catfish pond can stand for 10 years before needing maintenance. At that time, the levees, which have eroded through wave action, will have to be repacked. Occa-

sionally, the entire pond needs to be drained and rebuilt by scrapers or bulldozers because of the sediment that has washed down into it.

Maintaining the required oxygen level in pond water is one of the biggest problems. The primary source of oxygen in ponds is from the algae through the process of photosynthesis. This process requires sunlight. If there are three or four cloudy days this process ceases, causing fish to suffocate. Oxygen is also absorbed into the water by surface turbulence caused by wind. So cloudy, still weather can spell trouble.

Resourceful catfish farmers have devised methods to solve these problems. One technique is to pump and recycle pond water using an aerator. The aerator shoots the water up and back into the pond, catching the oxygen in the air in the process. Another method is to take an axle from a car or truck and attach small paddle wheels on each side where the tires were. Then the axle can be attached to a tractor so that the paddle wheels beat the water simulating

marshes, and other poorly drained wet lowlands; and coastal zones.

A second advantage is that aquaculture provides another use for the approximately 2.7 million farm ponds currently existing in the United States. The farm ponds are now used for holding the water table near the ground surface, irrigation, and flood and erosion control, as well as for stocking fish.

The field of aquaculture is complex. Selection of suitable pond sites depends upon water quantity and qual-

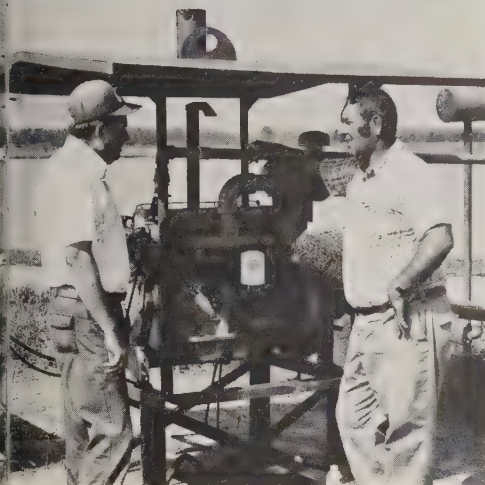
ity, land features and availability, soil quality, climate, and access to supplies and markets. The potential for disrupting the ecology and damaging the environment needs to be considered. The pros and cons of aquaculture development should be weighed on a case-by-case basis.

Under the guidance of trained personnel, aquaculture facilities can be designed for maximum productivity while insuring conservation of the environment. The Soil Conservation Service provides this expertise by in-

forming landowners of the potential of their resources for aquaculture, and giving technical assistance in facility design and layout, water management systems, and other aspects of fish culture.

Through the combined efforts of landowners and Federal, State, and local agencies, sound resource decisions and the success of aquaculture are assured.

Dr. Teels is staff biologist, Ecological Sciences and Technology Division, SCS, Washington, D.C.



Far left, at an irrigation well that provides water for his four catfish ponds, A. B. Evans (left) looks over his fish farm operation with SCS District Conservationist Don Templeton. Near left, aerators that shoot water up into the air and back into the fish ponds help farmers insure the proper amount of oxygen is available to the fish at all times.

wave action which adds oxygen to the water. A third method is to pump fresh water into the pond.

A minor problem related to oxygenation is the threat of aquatic weed growth. The pond must be kept at a minimum depth of 4 feet, so that sunlight won't reach the bottom. When the water becomes too shallow, weeds start growing. Like algae, weeds may also die and decay and deplete oxygen, making harvesting more difficult.

It generally takes about 1½ years to grow catfish to market size. After the fish are spawned in June, they are placed in fingerling ponds where they grow to a length of 6 to 8 inches during the summer and fall. The fish are then transferred to production ponds where they are generally stocked 2,000 to 3,000 per acre. They remain in these ponds until they weigh 1 to 1½ pounds, which usually takes 8 to 10 months. The catfish are then sold to local processing plants or to live haulers who take them to sport fishing lakes located primarily in the Midwest.

Catfish production started in Humphreys County in 1965 with two farmers and less than 100 acres in ponds. Since 1965, business has boomed. Sixty-six catfish farms, producing over 22 million pounds of catfish annually, now contribute more than \$22 million to the county's economy.

A. B. Evans of Isola was one of the first catfish farmers in Humphreys County. Evans talks about his experience in farming:

"I didn't have enough land to grow crops profitably. In 1969, a neighbor, who had started fish farming on a small scale, suggested that I try it and brought us his records to review. My wife and I were convinced that there was more money in fish farming than in row crop farming for a farm our size.

"We asked the local SCS office for help. SCS District Conservationist Don Templeton had worked with every farmer in our county who had built catfish ponds and he knew the problems we might run into. We asked him to look over an 80-acre tract of land and to rec-

ommend a proper pond layout and estimate the cost. We told him how much we could spend on the project.

"Templeton determined the best location for the well and designed four ponds. Some farmers had tried smaller ponds, but they required more money for the levees and drain pipes. Templeton's guidance in the best use of our land resulted in considerable savings in construction costs.

"Catfish farming was a new venture for farmers. Many things had to be learned by trial and error, and errors in pond construction are costly. Maintenance of levees is expensive and, based on Templeton's advice, we are now building wider levees with greater slope.

"Without SCS's help and advice, Humphreys County would not have become the 'Catfish Capital of the World.' "

Mr. Templeton is district conservationist, SCS, Belzoni, Miss.

Crawfish Farming in Cajun Country

by Steve Foland



Whether fried, boiled, or smothered (étouffé), the recipes are not so important to the people of the Acadian Coast in south-central Louisiana as the crawfish in the recipes are. As one of these friendly people of French descent says, "I don't suppose there is anything that won't eat crawfish, but their worst predator is a hungry Cajun."

For political reasons, the ancestors of these Cajuns, or French-speaking Louisianians, were deported by the British from Acadia, Canada, in 1755. The Acadians, or Cajuns, of today tell a story about the Atlantic lobster following their hapless forebears from the area now known as Nova Scotia to a new home in the sultry South. In the new clime, according to the myth, the crustaceans became much smaller, fresh-water creatures; but they still had the ability to please the discriminating palates of the Cajuns.

Perhaps because of their heritage, the people of Louisiana now produce and consume about 90 percent of the U.S. crawfish crop. This figure is slowly

changing, though, through the efforts of farmers like Fred Kyle in St. Mary Parish, La. Kyle, a one-time catfish farmer, has turned 210 acres of old rice fields into an efficient crawfish farm, and he is looking to the Northeast as the market for his crop.

Kyle's operation typifies a business-like approach to the only large-scale crustacean aquaculture in the United States. Instead of laboriously wading beside the wooden canoelike *pirogues* traditionally used to harvest the trapped crawfish, Kyle and his helpers speed from trap to trap in air boats. By suspending the chicken wire traps from plastic floats instead of securing them to stakes that could be knocked over by the somewhat erratic boats, Kyle is able to use the airplane-propeller-driven craft and cut his harvest time by about 30 to 40 percent.

Kyle also built a processing plant that has developed and patented machinery that can process five times more crawfish an hour than old-fashioned hand methods. Mainly through



Far left, Fred Kyle (left) steers an airboat through alligator weed toward a crawfish trap. Brad Broussard, SCS district conservationist (center), and Jay Hunter, a biologist at Southern University, count the crawfish harvested to aid Kyle in his pond management. Near left, Kyle (left) and a helper sort crawfish.

the efforts of an enthusiastic young marketing representative, Steve Afe-man, most of the frozen crawfish tails processed by the plant now go to such outlets as exclusive New York City hotels that are looking for exotic entrees for their menus. Perhaps as crawfish farming spreads and becomes more efficient, the crawfish will become an available item in the frozen food sections of most U.S. grocery stores.

The conversion of the rice fields to crawfish ponds was not problem free. The fields were along the edge of a muggy swamp with its undesirable weeds and tidal fluctuations.

Kyle contacted biologists at Louisiana State University and at Southern University for information on the breeding and feeding habits and proper habitat for crawfish. He also asked the Soil Conservation Service for assistance in preparing the ponds.

According to District Conservationist Brad Broussard, SCS designed levees to enclose three square ponds of 10, 80, and 120 acres. The tops of the

levees are about 5 feet above sea level, and the bottom of the ponds at the lowest point is below sea level.

Kyle installed a pump in the lowest corner of the ponds, and all the water used for the crawfish is pumped into and out of the ponds as needed. The two smaller ponds are drained by gravity into the largest pond, and the pump sends the water from the large pond into the cypress and hardwood swamp beyond the levee.

In addition to eliminating the tidal fluctuations, the levees and pump allow Kyle to cultivate the bottoms of the ponds when they are dry to control undesirable weeds in the ponds. Water hyacinths and other aquatic plants that plague the ponds begin decomposing when the ponds are flooded to production level, and the decomposition robs the water of oxygen essential for the crawfish.

SCS, in addition to supplying Kyle with Japanese millet seed from an SCS plant materials center, recommended practices that would encourage the

growth of alligator weed. The millet and alligator weed provide food, cover, and valuable shade for the crawfish.

The swamp around the ponds still supports abundant fish and wildlife. Bear, bobcats, foxes, and alligators live in and roam the steamy wetland beyond the perimeter levee that Kyle calls "the last dry land between here and Cuba." Kyle does all he can to maintain and enhance the suitable wildlife habitat—even to instructing workers on the farm to release snakes accidentally caught in the crawfish traps.

At SCS's recommendation, Kyle installed wood duck boxes designed to simulate the diminishing upright hollow cypress and hardwood trees used by the ducks for nesting. The ponds, as well as the swamp, are now shared by the wood ducks, the alligators, and, of course, the crawfish. An enthusiastic conservationist, Kyle doesn't mind if some of his profits are "eaten up."

According to Jay Hunter, biologist at Southern University, commercial crawfish ponds in Louisiana alone now cover about 50,000 acres, and ponds are being developed in such diverse places as Hawaii, South Carolina, and Spain. If all the commercial operations are based on Fred Kyle's type of operation and if all crawfish farmers share his concern for wildlife, various species will thrive as increased numbers of delectable crawfish are consumed by more and more people in the United States.

Mr. Foland is chief, conservation news and reports branch, SCS, Washington, D.C.

Louisiana Crawfish on the East Coast

by Albert H. Cole
and James W. Preacher

They look like Maine lobsters, taste like a cross between lobster and shrimp, and are a gourmet dish in Louisiana. The culinary treat is crawfish. Once confined to Bayou country, these crawfish are now being raised commercially on the South Carolina coast by landowners like Ed Fountain.

Fountain had been trapping and selling small native Carolina crawfish as fish bait for several years. Two years ago, he became interested in raising Louisiana crawfish as a gourmet food item after watching a Soil Conservation Service TV news program. The program showed SCS assisting a local cooperator who was establishing a crawfish pond. The development of the pond was part of the field trials started by SCS in 1976 to see if Louisiana crawfish could be farmed commercially in South Carolina lowcountry.

Fountain contacted SCS for help.

SCS personnel surveyed Fountain's prospective pond to determine if it would support crawfish on a year-round basis. They checked for such items as a dependable source of pollution-free water to flood the pond, water hardness required by the crawfish for proper shell development and growth, and a heavy clay-type soil which is capable of holding open burrows during reproduction cycles and is suitable for growing vegetation which feeds the crawfish. Two other items considered were distance to the market and available labor force for harvesting the crawfish.

The inspection of the pond proved favorable, so Fountain decided to set up his own commercial operation. Stanford Gauthier, SCS district conservationist in St. Martin Parish, La., arranged with a local processing plant to supply Fountain and other farmers with Red Swamp and White River crawfish.

In May 1977, 75 pounds of Louisiana crawfish were flown in and stocked in Fountain's 1-acre pond. Two weeks after stocking, water in the pond was slowly lowered. This allowed the previously mated female crawfish to burrow underground for the summer.

In addition to inducing burrowing for reproduction, the draining of the pond also eliminated any predatory fish and permitted the growth of aquatic food plants, such as alligator weed and water primrose. To supplement the crawfish's diet, Fountain planted smartweed and millet while the pond was drained.

In September the female crawfish laid their eggs. Two weeks after the eggs hatched, the pond was flooded again so the young crawfish could swim off and feed on the small, aquatic animal life and decaying vegetation.

Fountain says, "Everything went as

expected. The females hatched their eggs while in the burrow and came up with their young when the pond was flooded again in early October."

Harvesting of the adult crawfish began in late December and continued into May. The pond proved to be very productive with over 1,000 pounds of crawfish trapped and sold during the first year of operation. By next trapping season, Fountain plans to triple the size of his operation.

It is easy to count the benefits of crawfish farming. These crustaceans reproduce in large numbers and grow rapidly—60 to 90 days—to market size. A well-managed crawfish pond is self-perpetuating, and assures the best use of natural resources. Based on Fountain's and others' successes, in another 5 to 7 years crawfish farming should be a lucrative industry. South Carolinians, prepare to feast!

Mr. Cole was district conservationist, SCS, Florence, S.C., and is now retired. Mr. Preacher was formerly a biologist, SCS, Columbia, S.C.

Crane Habitat Recovery

by Clark Scoggin

The coastal lowlands of Jackson County, Miss., are generally flat with waterlogged, highly acid soils that were suited in the past only for substandard grazing and timber production.

The U.S. Department of the Interior's Fish and Wildlife Service (F&WS) has purchased a large tract of this land and established the Mississippi Sandhill Crane National Wildlife Refuge to provide nesting and feeding areas for approximately 40 remaining Mississippi sandhill cranes.

The Mississippi sandhill crane, an endangered subspecies, is found only in Jackson County. According to Jacob M. Valentine, Jr., biologist with F&WS in Lafayette, La., this is the last stronghold of a population which once may have stretched from Louisiana to Florida.

This large, long-legged gray bird has a bare red crown and long gray feathers that curl down over the tail. About the size of the great blue heron, this crane is heavier bodied, has a thinner bill—about as long as its head—and flies with its neck extended. Although the bird is nonmigratory, the loud unison call of the male and female can be heard during flight. The Mississippi sandhill crane is similar in many ways to the Florida sandhill crane, but features several minor taxonomic differences in measurement and color from other sandhill cranes.

The crane breeding grounds are found in the southern half of the county where two basic communities important to the ecology of the cranes exist: the savannas and the swamps. The greatest are the savannas, commonly called wet prairies. These are grasslands with scattered longleaf pine, cypress, and slash pine.

Until 1958, the area was open range

and livestock roamed freely over much of the land. The abolishment of free range ended the need for burning the range which maintained the wet prairies. These areas were then planted to slash pine and managed for intensive silviculture. Along with tree planting since the mid-1950's, shallow furrows were plowed through the open savannas. These furrows were connected to larger drainage ditches which emptied into bayous. The increased drainage which resulted changed the ecology of the wetland habitat, reducing crane nesting and feeding areas.

The original nesting and feeding areas are to be restored by the Young Adult Conservation Corps working with the F&WS on the refuge. Conservation practices to be implemented include low-level dams to control water levels in the savannas and swamps, clearing of brush and trees from the savannas to allow them to return to their original condition, and periodic controlled burning of the feeding and nesting grounds to prevent brush encroachment.

The Soil Conservation Service helped locate sites for the dams and provided information about the soils and flooding frequency, as documented in the Jackson County Soil Survey. The soil survey was prepared by SCS and the Mississippi Agricultural and Forestry Experiment Station as part of technical assistance provided to the Jackson County Soil and Water Conservation District.

With the exception of woodpeckers and perching birds, there is a scarcity of wildlife on the refuge. Quail and dove are seen occasionally along refuge roads and open areas. As the proposed habitat management practices are implemented with small areas being

cleared, the increase in the edge habitat will benefit many species of wildlife in addition to the Mississippi sandhill crane, which has been called "the world's rarest crane."

Nineteen of these beautiful birds now live in captivity at the Patuxent Wildlife Research Center in Laurel, Md. Biologists hope to secure 10 breeding pairs in captivity. Their young will be used to increase the crane population in Jackson County.

Mr. Scoggin is district conservationist, SCS, Pascagoula, Miss.



Riparian Symposium Proceedings

On December 11-13, 1978, 24 government agencies and private organizations cosponsored the first national riparian symposium. The symposium, titled "Strategies for Protection and Management of Floodplain Wetlands and Other Riparian Ecosystems," focused on the multiple values of riparian ecosystems and the need for comprehensive interagency planning and management to protect and enhance these ecologically sensitive systems.

The proceedings consist of 55 papers which discuss findings of ongoing programs; new insights into ways of developing comprehensive interagency programs to address riparian ecosystem problems; and characteristics, values, and management of flood plain wetlands and other riparian environments. Included under the management section are position papers by the U.S. Environmental Protection Agency, USDA's Forest Service and Soil Conservation Service, and USDI's Fish & Wildlife Service and Bureau of Land Management.

A limited supply of the proceedings is available from USDA's Forest Service, Office of Information, P.O. Box 2417, Washington, D.C. 20013. Request General Technical Report WO-12.

USDA Pumps Irrigation Wells by Wind

A prime energy user in production agriculture, irrigation accounts for 13 percent of all energy used on farms. In the Southern Great Plains, irrigation pumping consumes about 50 percent of the

energy used on irrigated farms. Irrigation farmers are worried about the cost of energy and the uncertainty of energy supplies.

In response to these concerns, the USDA Southwestern Great Plains Research Center in Bushland, Tex., has successfully carried out a wind energy project for irrigation pumping. In a paper presented before the American Society of Agricultural Engineers (ASAE), Agricultural Engineers R. N. Clark and A. D. Schneider described the project. Its objectives were to assemble a complete wind-power pumping system for irrigation wells to adapt or modify existing pumping equipment so that it could be effectively powered by a wind turbine, and to make economic analyses of wind pumping systems. Results were better than expected: 65 percent of the energy used to pump water was supplied by the wind, for a 65 percent savings in electrical cost.

The USDA engineers coupled a large vertical-axis wind turbine to an existing deep well irrigation pump system. The pumping system used both the wind turbine and an electrical motor to power the irrigation pump in a "wind-assist concept," using an overrunning clutch to synchronize the two power sources. The clutch, combination gear drive, and connecting shafting were all purchased as "off-the-shelf" items commonly available in irrigated areas, and the pump was adapted without modification. Promising lower initial cost and reduced maintenance, the convenience of readily available components is a big plus. In addition, new machines are being developed that should be economically priced, reliable, and that will provide farmers with a good power unit for their pumps.

At Bushland, the wind turbines are expected to produce some power from the wind at least 70 percent of the year, and about half of the required power for irrigation during 18 percent of the year. The USDA engineers are optimistic that the wind-powered pumps could soon be providing an alternate source of energy for irrigated agriculture throughout the country. For further information on this project, contact Roger Castenson, ASAE, (616) 429-0300, and request Item WM-78-2549.

Study Underway of Farmland Conversion to Nonagricultural Uses

The U.S. Department of Agriculture (USDA) and the President's Council on Environmental Quality (CEQ) will conduct an interagency study to investigate the extent and causes of conversion of agricultural land to nonagricultural uses.

The study also will assess efforts of State and local governments to retain agricultural lands and will identify ways in which these efforts could be made more effective.

The study is to be completed by January 1, 1981, and submitted to the President.

Secretary of Agriculture Bob Bergland and former CEQ Chairman Charles Warren signed a memorandum of agreement to carry out the study and will cochair the study group. Bob Gray, formerly administrative assistant to Rep. James Jeffords (R-Vt.), has been named study director and will head a full-time staff. Members of a coordinating group will be named from other Federal agencies whose actions affect agricultural land.

Meetings:

October

3-7	American Horticultural Society, Portland, Oreg.
7-12	Water Pollution Control Federation, Houston, Tex.
10-12	Hardwood Plywood Manufacturers Association, Los Angeles, Calif.
12-18	American Association of State Highway and Transportation Officials, Hartford, Conn.
13-17	American Planning Association, Baltimore, Md.
14-17	Society of American Foresters, Boston, Mass.
16-18	Agricultural Research Institute, Washington, D.C.
20-25	National Environmental Sanitation & Maintenance Educational Conference/Exposition, Clearwater Beach, Fla.
22-26	American Society of Civil Engineers, Atlanta, Ga.
25-28	National Association of Biology Teachers, Inc., New Orleans, La.
28-31	American Forestry Association, Charleston, S.C.
28-Nov. 1	Congress for Recreation and Parks, New Orleans, La.
29-30	Benefiting From Environmental Monitoring Conference, Arlington, Va.
31-Nov. 4	The American Society of Landscape Architects, New Orleans, La.

November

4-7	The Irrigation Association, Marco Island, Fla.
5-8	The Geological Society of America, San Diego, Calif.
5-9	National Adult Education Association, Boston, Mass.
7-9	Future Farmers of America, Kansas City, Mo.
11-14	National Agricultural Bankers, Salt Lake City, Utah
11-14	National Association of State Universities and Land Grant Colleges, Washington, D.C.
11-14	National Forest Products Association, Palm Springs, Calif.
12-20	The National Grange, Lancaster, Pa.
15-16	National Conference on Soil Conservation Policies, Washington, D.C.
25-29	American Institute of Chemical Engineers, San Francisco, Calif.

December

2-5	American Society of Farm Managers and Rural Appraisers, Inc., Chicago, Ill.
3-7	American Geophysical Union, San Francisco, Calif.
3-7	Symposium on Surface Mining Hydrology, Sedimentology and Reclamation, Lexington, Ky.
4-7	Western Forestry Conference, Spokane, Wash.
6	Keep America Beautiful, Inc., New York, N.Y.

Agricultural lands have been disappearing at the rate of nearly 3 million acres per year, according to USDA. Many of these acres are converted to urban uses or used for highways, airports, shopping centers, and other nonfarm purposes. Some acres are covered by water.

"If our best farmlands are used for other purposes," said Bergland, "we may face decreasing production, increased energy needs, and higher prices for commodities."

Bergland said USDA's revised land-use policy, issued October 1978, shows its commitment to assure the maintenance of agricultural lands. Well-managed farm and forest lands often provide important environmental benefits, including wildlife habitat, open space and recreational opportunities, as well as a stable economic base, he said.

A recent report prepared for CEQ by the National Conference of State Legislatures showed that 48 States and many local governments have adopted agricultural land retention programs of one form or another.

"We need to evaluate the effectiveness of the various agricultural land protection efforts from a national perspective," Warren said, "and make this evaluation available to State and local government officials and others concerned about this problem."

Warren also indicated that the study would evaluate the role of Federal agencies in agricultural land conversion and recommend policy changes if appropriate.

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AGR 101





Soil Conservation

November 1979

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What's Environmental Education Worth?

From the Administrator

Not every insurance policy pays off in dollars.

An example is the investment of a conservation district's time in environmental education.

There is no better insurance against damage to our resources. It's a policy that will pay off handsomely when the children we help educate today make the right kind of resource decisions tomorrow.

Some busy conservationists don't agree. They protest that when demands on their time begin to mount, environmental education should take a low priority. After all, they ask, what's more important: helping a farmer lay out terraces or talking about soil conservation at a teacher workshop? The answer has got to be—both.

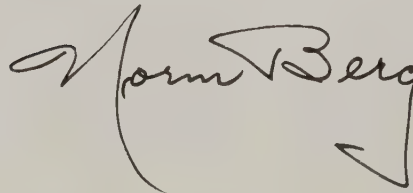
Many educators believe that, as a Nation, we haven't begun to invest enough time and money in teaching youngsters about their environment.

The U.S. Office of Education warns that "we have paid dearly for this neglect (of environmental education) in the land eroded and destroyed . . . water and air polluted . . . and in the daily waste of resources."

From kindergarten up, schoolchildren need the chance to learn about resources outdoors, in real-life situations. They need to analyze problems, plan projects, do useful work, and watch what happens as a result. A project doesn't have to be a major undertaking. It can be as simple as planting a tree, spreading woodchips on a nature trail, or throwing litter on the school compost heap. But it may teach city children a lesson they'll never forget.

To help district leaders and other conservation-minded people learn how they can help, there is an excellent new "Conservation District Guide for Education Programs," prepared by the National Association of Conservation Districts. Several State associations of districts are already putting the guide to use. It contains detailed suggestions for incorporating environmental awareness into school and college curricula, youth group programs, teacher inservice seminars, and adult workshops.

There is a bonus in such activities for the SCS employees and district supervisors who give them their time and effort. Working with children is one of the best ways to capture a fresh outlook on resource conservation. Their questions, their comments, and their enthusiasm can do as much for the conservationist as the conservationist is doing for the mind of the child.

A handwritten signature in black ink that reads "Norm Berg". The signature is stylized, with a large, sweeping "N" and a long, curved line extending from the bottom of the "B" that loops back under the "N".

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Soil Conservation

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Cover:

According to SCS Administrator Norman A. Berg, "children need the chance to learn about resources outdoors, in real-life situations." The articles on pages 4 through 17 present a variety of conservation education activities.

A Look at Conservation Education in Oklahoma

A study to find out if teachers are applying what they've learned; an outdoor classroom in the city; and a week-long environmental study camp are among the conservation education activities going on in Oklahoma.

Evaluating Teacher Education

by Terence Mills
and Jane S. Burris

An Oklahoma environmental education study that was concluded in 1977 is pointing the way to better conservation learning experiences for public school teachers and students in that State.

The study, which includes evaluation of programs, is part of the Conservation Education Leadership Training Program being done by Oklahoma State University at Stillwater; East Central State University, Ada; Southwestern State University, Weatherford; and Northeastern State University, Tahlequah. Teachers completing the conservation education program receive assistance and support from local conservation districts, the Soil Conservation Service, and the Oklahoma Conservation Commission.

Like most teacher inservice programs, the built-in evaluation procedure was originally limited to a course grade that goes on the student's record. Since this kind of evaluation does not attempt

to quantify the implementation of programs or determine levels of change on the part of the individual teachers, a quantitative evaluation procedure was added during the 1977 training session.

During the graduate level summer program, teachers attend class 8 hours a day for a month to prepare themselves to return to their schools as leaders in the development of outdoor classrooms and environmental education programs.

The first phase in evaluating the effectiveness of the leadership training program involved tests taken by 60 participants before and immediately after the 4-week summer session. Statistical differences between pre- and post-test scores showed a significant increase in the teachers' knowledge of concepts related to the environment. There was also a similar gain in knowledge of available conservation education material. Prior to the program,

Studying the Outdoors in the City

by F. Dwain Phillips
and Paul Hamilton

Watching a bird hatch her eggs, a cottontail rabbit raise her young, and studying an ant den sound like outdoor classroom observations for kids in a rural community. But these and many more experiences in the outdoors are being shared by more than 400 students in Tulsa, Okla. Students at Columbus Elementary School study the outdoors in their 90- by 120-foot outdoor classroom on their schoolground in the middle of the city.

On May 17, 1979, nearly 500 parents and friends came to hear the mayor of Tulsa dedicate the first outdoor classroom in the Tulsa Public School System. It seems likely, with all the



Using plants donated for the outdoor classroom, Jane Burris shows students proper planting techniques.

teachers were generally not aware of the technical help, literature, and curriculum materials available to them in conservation education.

The second phase of program evaluation involved gathering data 8 months after the participants had returned to their teaching activities. This second phase was considered even more important than the first, because knowing that there was a significant gain in the teachers' knowledge was no guarantee that the conservation understanding of their pupils would be enriched.

In fact, the first phase showed no significant relationship existed between teacher gains in conservation concepts and actual implementation activity. A complete evaluation would be lacking until data were gathered on increased conservation activities in the schools. Therefore the second phase was conducted to determine the degree of implementation and to identify factors that

influenced the implementation of conservation and environmental education activities.

The results indicate that 86 percent of the summer school respondents actually did implement a program in their schools. Furthermore, these teachers reported receiving additional assistance from the local conservation district board of directors as a cooperative effort developed between the local district and the schools.

The analysis showed a significant increase in the use of the out-of-doors as a learning laboratory and in the number and variety of subject matter areas in which environmental concepts were included—such as art, music, social sciences, and math as well as in science.

Surprisingly, there was no apparent relationship between conservation education program implementation and whether a participant was a science teacher, urban or rural teacher, or male

or female. Contrary to popular opinion, the rural, male science teacher is not the only educator ready to include conservation education in the classroom.

As expected, programs were more often developed where the teacher received support from the school administration. Curriculum changes are, to a large degree, dependent on the attitude of the school principal. Perhaps advanced conservation education programs should make an effort to include the principal with the teachers as part of a school team. In schools where implementation took place, the school administrator was influenced by participating teachers. The study also revealed that 140 additional teachers became interested in conservation activities through their association with a teacher who participated in the program.

The summer training program was extended into the school year during the 1978-79 academic year at the co-

Continued.

attention Columbus school is getting, that this will not be the last outdoor classroom the mayor will be asked to dedicate.

The project began through the efforts of Jane Burris, science teacher for grades 2 through 6. After attending a summer course held to train teachers in environmental education, she prepared a proposal for an outdoor learning site. Since the Tulsa County Conservation District had sponsored her attendance at the workshop and paid half of her tuition for the course, they were the first ones she called on for help.

Through the district, she received assistance from the local Soil Conserva-

tion Service office and a conservation education specialist from the Oklahoma Conservation Commission. The landscape architect from the SCS State office helped design the area.

Her detailed proposal explained how the outdoor classroom was to be developed, what funds were needed, and how the area could be used by teachers and students—not only in science but in all courses. The proposal was approved by the superintendent of Columbus Elementary School and by the Tulsa Education Service Center. The Parent-Teacher Association donated \$500.

Site development began in October

1978 with installation of a fence around the area. Tools and plants were donated by parents. Woodchips for the learning trail came from the Public Service Company of Oklahoma. Two minigrants of \$15 each from the conservation district paid for a wildlife packet of plants and more tools. A school work crew prepared the soil for planting and placed logs throughout the area.

The rest of the work was done by the students themselves on bird feeders, a weather station, a garden, native grass plot, and trails. Careful planning protected an existing red ant den. Part of the garden was planted late to allow a kildeer to finish raising her young in a

Continued.

operating universities. A grant from the National Science Foundation helped fund the continuing training for teacher participants of prior summer programs. The purpose of the academic year program is to give teachers an opportunity to work with environmental scientists and to further improve their content background in environmental education while they are in the process of implementing a program in their school. The need for the 1978-79 academic year extension was identified in the 1977 study.

Dr. Mills is professor of science education, Oklahoma State University, Stillwater, Okla.

Ms. Burris is a teacher, Tulsa, Okla., and recipient of the 1977 Conservation Education Teacher of the Year award presented by the Oklahoma Council of the Soil Conservation Society of America.

More Than a Walk through the Woods

by F. Dwain Phillips
and John R. Bogard

Studying the environment during a week-long workshop is more than a walk through the woods for junior high school students in Osage County, Okla. The students camp out in tents, fish for their supper, cook their breakfast on an open fire, and learn which native plants they can use in a salad. During the week, 40 students from schools throughout the county study wildlife, soil and water conservation, plants, insects, minerals, pollution, and more. Nearly all of their school-learned skills, including the three "R's," are put to practical use in problem solving and ecology investigations.

Ben Sanders, superintendent at the Indian Camp Junior High School at Pawhuska, established the first of these student outings in 1977 after attending a 1-day teachers' workshop sponsored by the Osage County Conservation District and the Soil Conservation Service. He draws upon the volunteer services

nest on the ground in one corner. A pond and a wildflower plot still remain to be done.

Some of the plants were cared for by Boy and Girl Scout Troops in the summer, which helped them earn merit badges. Another local Boy Scout Troop made and donated a bird feeder for the site. Parents have also volunteered to help with maintenance of the site during the summer.

Mr. Phillips is public information officer, SCS, Stillwater, Okla.

Mr. Hamilton is district conservationist, SCS, Tulsa, Okla.

Youths at the Osage County conservation camp study soil and plant relationships. They learn how to identify various grasses such as indiangrass, the State grass.



of conservationists, environmental education specialists, water quality experts, a reptile specialist, arts and English teachers, a petroleum engineer, and others to make the camp a valuable learning experience for the students.

The camp is under the sponsorship of the Osage County Conservation District, which contributes \$1,000 each year to the camp fund. Others who have contributed funds include several individuals and local businesses, the Pawhuska Kiwanis Club, and Ark-Kay and Kay County Conservation Districts. Part of the money has been used to convert an old school house into a dining hall and classroom for the camp.

During the day, the students are divided into groups of 10 to 12—boys and girls near the same age but from different schools. Each group is assigned a full-time camp counselor who works and eats with the group and is involved in all of the learning activities.

Evening recreation includes fishing, sailing, horseback riding, volleyball, or just relaxing with a friend.

SCS provides a training session on soils, using a soils pit and nearby landfill. Sessions on soil and plant relationships were presented so students discovered how soils affect their everyday lives.

An engineering survey problem was added to the second and third workshops. SCS Conservation Technicians Bill Leedom and Bill Thomas and Range Conservationist Pat Broyles gave surveying instructions. Students ran elevation surveys to determine the depth of flooding that might occur at the Bird Creek School from nearby Bird Creek if the dam failed. They also computed the available water supply in Bluestem Lake and the length of time it would supply the city of Pawhuska should a drought occur.

Sanders has formed a corporation

known as the Osage County Outdoor Conservation Education Center. He is raising funds to hire a full-time director to coordinate activities at the center. The director would schedule several workshops throughout the year involving county students and would also be available to individual schools and teachers to help them develop outdoor classrooms at school sites.

Sanders expressed his thoughts about the success of the camp when he said, "I've had 10 years of experience in education and these camps have been my most productive educational experiences."

To the kids, it is a fun way to study their environment.

Mr. Phillips is public information officer,
SCS, Stillwater, Okla.

Mr. Bogard is district conservationist,
SCS, Pawhuska, Okla.



At the camp, junior high school students observe aquatic life and conduct routine water tests at Bluestem Lake, a reservoir for the city of Pawhuska.

Conservation Education in all Directions

In Pennsylvania, conservation education covers a lot of ground. A worm speaks out, a fort lets down its guard, Indian tradition shows the way, and streams give up their secrets for outdoor learning.

Wee Willie Worm

by Jeffrey R. Loser

What is light brown in color, 8 feet long, and goes to school? The correct answer is Wee Willie Worm.

Willie is a teaching tool used by the Allegheny County, Pa., Conservation District to talk to its younger citizens about conservation. Many grade school children have a better understanding of natural resources after a visit from Willie.

The worm was originally created in 1970 by Donna Simmons, program coordinator for the district, as a cartoon symbol for a column in the district's newsletter. Simmons has worked for the district for 16 years and has always tried to promote its goal of conserving the county's natural resources. She developed the Wee Willie Worm character and news column to introduce conservation to children.

As the Wee Willie news column grew in popularity, each article was followed by a quiz. The first five children to send in the correct answers won a Wee Willie Worm T-shirt. Once, an entire sixth grade sent in their answers to one of the conservation quizzes. To their delight, Willie sent them a personal letter of thanks, saying how important it is to take care of the plants, animals, air, water, and soil.

To supplement the conservation news column, Simmons looked for a way to work with groups of children. In 1978, she designed a Wee Willie Worm costume. Now, bigger-than-life, Wee Willie visits county schools.



Wee Willie Worm takes time out from conservation lessons to hug a few human friends.

Through Willie, Simmons talks to elementary school children about how important the soil is to worms and other animals, and to plants used for food, and how soil erosion affects them. Willie helps the children to see the interdependence of all elements of nature, and to understand the meaning of, and need for, conservation.

Willie gives Simmons' lessons a unique twist. She also uses flip charts, soil samples, and slides in her presentations. At the end of her program, she gives each child a "Wee Willie Worm's Workbook," a coloring book with nature puzzles and pictures of different types of plants and wildlife.

Wee Willie Worm also speaks to Girl Scouts, Bible schools, and other children's groups. Willie's even made a guest appearance before a Pennsylvania State University graduate class to talk to teachers about environmental education.

The conservation district directors admit that Wee Willie is an education gimmick—but a serious and effective one. Donna Simmons says, "There is no doubt that this worm brings conservation down to earth."

Mr. Loser is district conservationist, SCS, Pittsburgh, Pa.

Fort Roberdeau Park

by Tim Emenheiser

Fort Roberdeau, in Blair County, Pa., today "guards" the entrance to a thriving outdoor educational laboratory. During the Revolutionary War, the fort protected a lead mining industry from Indian attack. Fort Roberdeau was restored during the Bicentennial and now attracts tourists, especially children's groups, from all over central Pennsylvania.

The adjacent 29-acre tract of mature woodland blossomed into a network of nature trails as a result of the joint efforts of the Blair County Conservation District and the Soil Conservation Service. The trails together with the fort make up Fort Roberdeau Park.

Charles Birchfield, executive assistant for the Blair County Conservation District, was responsible for developing the tract, and was able to hire workers under a \$75,000 grant through the Comprehensive Employment and Training Act (CETA) of 1973. With technical assistance from SCS, construction of the trails was completed during the summers of 1977 and 1978.

Most of the materials used for construction of bridges and other park improvements were obtained on the site or donated by local groups.

One project targeted for improvement was the stream which was slow flowing and too shallow to provide fish habitat. With SCS's guidance, the CETA work crew built jack dams to create pools for the fish. They also installed rock riprap

to prevent streambank erosion, especially around bridge abutments. The stream is now stocked with brook trout.

Another wildlife habitat improvement was the addition of bird and game feeders which are supplied with food at critical times of the year when natural food is exhausted or heavily covered with snow.

The park is divided by four trails, each of which can be leisurely walked in about 20 minutes. The trail system is well planned and provides safe and easy maneuvering for the very young, older citizens, and the handicapped. The trails are 5 feet wide, covered with bark chips, and have bridges for crossing a mountain spring-fed stream and marshy areas.

Fort Roberdeau Park provides a brochure which maps the trails and describes learning sites and outdoor classrooms which are marked and identified throughout the trails. An outdoor classroom is an improvised "lecture hall," made up of four or five rows of logs split in half and pegged into the ground.

In addition to pointing out the different types of trees, vines, and seasonal wildflowers, the brochure also applies the idea of "reading" the environment, of understanding and looking for signs of interrelationships.

For instance, visitors are excited when they can look at a tree and determine from the brochure that it is a den tree which gives shelter to gray squirrels, or perhaps larger animals such as raccoons. People learn that when they see a sour-gum tree, or the grapevines that cling to its upper branches, they are looking at an important source of food—berries and seeds—for birds and animals.

The trail brochure directs attention to the root system on one uprooted tree which had grown in shallow soil, and to the roots of another fallen tree still clinging to the soil and stones which had once supported it. At a third point of interest, the observer can tell from its exposed roots that a black birch tree started from a seed which sprouted on a tree stump. As the seedling grew, it was fed by the decaying stump.

One learning site stimulates the imagination with a brief lesson in history. The brochure points to a spring feeding the Black Swamp and explains that early settlers submerged their roof shingles in the black muck to render them fire resistant. This afforded them some protection from the Indians' burning torches and flaming arrows.

Fort Roberdeau Park has served more than 2,000 teachers and students since it opened in 1978. The Blair County Conservation District will continue to develop learning opportunities that combine history, natural science, and conservation in Fort Roberdeau Park.

Mr. Emenheiser is district conservationist, SCS, formerly at Hollidaysburg, now Brookville, Pa.

Reviving a Tradition

by Lowell Edminster
and Michael Young

A plastic container and a magnifying glass used with the right instruction can open the world of aquatic life for observation and study.

The Meesing Nature Center is rekindling the spark of an old tradition in Monroe County, Pa.: the tradition of environmental awareness.

The area was first inhabited by the Lenni Lenapi Indians who understood the balance of nature and lived in harmony with the land. Next came the Pennsylvania Dutch with their neat and well-kept farms. They admired the pristine beauty of the wilderness and, like the native Americans, took only enough game to fill their tables and only enough timber to build shelter. Woodlots were carefully harvested to insure firewood and lumber for future generations.

So it remained until the early 1900's when tourists discovered the grandeur of this countryside. City people wanted to escape the crowded urban areas of nearby New York and Philadelphia, and development became inevitable.

Footpaths widened out to wagon tracks which were replaced by four-lane

highways. Teams of oxen and horses gave way to chain saws and bulldozers. Timber stands, as well as family farms, disappeared beneath housing developments.

Today, the Monroe Conservation District has a big job. The remaining natural resources of Monroe County can only be saved by making people aware of their values. So, Meesing Nature Center was founded in January 1976 to promote conservation through education.

The concept of the nature center was influenced by the late Marvin Burrus, who focused on the district's youth. "Today's young people will be tomorrow's citizens," he reasoned. "Give them an appreciation for nature, and they'll make sound land use decisions when they're grown."

Burrus founded the Junior Conservation Board, which was made up of students representing each of the local high schools. It served as a clearinghouse for ecology events in the schools, as well as for regional activities. The Junior Conservation Board also helped to steer the district's attention to youth activities and education programs, and eventually to the establishment of the Meesing Nature Center.

Many people were responsible for making Meesing a reality. The conservation district engaged Patrick Calpin as executive assistant to organize the center. Calpin hired five naturalists, through the Comprehensive Employment and Training Act of 1973, to help him set up programs, classes, and nature trails. Money was raised through contributions from speaking engagements, memberships, birdseed saving day, and the Campaign to Remove Unsightly Debris (CRUD), where local citi-



zens pledged so much per bag to have litter picked up.

The Pennsylvania Bureau of Forestry supports the center by leasing it 100 acres which are adjacent to another 2,000 in the Delaware State Forest.

Technical assistance has been provided by several State and Federal agencies. The Soil Conservation Service provided aerial photographs for site planning, while local groups took surveys and inventories. An SCS-designed pond was built with Pennsylvania Game Commission equipment. The Youth Conservation Corps helped build 11½ miles of trails through managed woodlands, swamps, and along a stream that runs through the center.

The trails of the Meesing Nature Center are interesting and well planned. They include a self-interpretive trail that winds through a pine forest and hardwoods, a bog trail now under construction, a trail that runs through a clear-cut area in its fifth year of regeneration, and a sensory trail for the visually impaired.

The sensory trail is built with posts about 4 feet high which are connected by a nylon cord at the top. A system of knots in the cord signals the user that he or she is standing at a point of interest. Each time a hiker reaches a knot, he or she turns on a tape recorder (unless accompanied by an interpreter) and is instructed to touch or smell something. Participants with normal sight also walk this trail blindfolded to learn how to use and enjoy their other senses in observing nature. An experimental camp for deaf children at the center successfully completed its first session during the summer of 1979.

On Saturday mornings, the Meesing staff conducts classes on beekeeping,

nature photography, useful plants and wildflowers, maple sugaring, and other topics. When the sap is flowing in the sugarbush, the groups of children are told how the Lenapi Indian first gathered this natural sweetener. They then get involved all the way from tapping the tree to tasting the real thing—pure maple syrup.

Teachers take advantage of the center's expert staff. They bring their students to the center to watch birds from an observation blind while they feed at hand-built feeders; to learn how to tell the age of a tree from its growth rings; and to perhaps spot a new plant or animal. And the ecology lesson plan goes on from there—naturally.

When class can't be held in the woods, a little bit of the woods is taken to the classroom. Staff naturalists visit schools with slides and a "discovery box" to give a closeup on wildlife. In the discovery box, the students may find anything from bear skulls to Indian artifacts to a stuffed otter.

When summer comes and school's out, environmental education goes on. Meesing offers a week-long conservation camp in cooperation with the Monroe County Sportsmen's Association and East Stroudsburg State College. You might hear from one of the 30 campers that "there just isn't enough time to do everything!"

The 15- to 18-year-old campers discuss soils, land use, and land management. They participate in archery, mountain climbing, firearms safety, night walks, stream study, fish surveying, a geology tour of the Delaware Water Gap, and canoeing on the Delaware River.

There is a lot happening with the Meesing Nature Center. In only 2 years,

since the beginning of the pilot project, 10,500 people have been served. The Pennsylvania Association of Conservation Districts named the Meesing Nature Center the "Outstanding Conservation Organization of the Year 1977." In 1978, the Monroe Conservation District was selected as the Northeast Regional NACD-Allis Chalmers Conservation Education District because of their Meesing project.

Meesing is still building. Plans are underway to construct a log and stone structure to be heated by solar and wood energy both for economy and as a practical teaching opportunity. There will be space for meetings, classes, a library, and research facilities.

Where does this all lead? In environmental education, it's quite true that the "sky's the limit."

Mr. Edminster is district conservationist, SCS, Stroudsburg, Pa.

Mr. Young is photographer, Meesing Nature Center, Stroudsburg, Pa.

Learning Conservation From a Creek

by Richard Heaslip

Stooping, scooping, and snooping into the lives of aquatic creatures, 10th and 11th grade students are studying Chickies Creek in Manheim, Pa. Armed with nets, bottles, and portable electronic gear, the students scour the southeast Pennsylvania stream for aquatic insect life and signs of pollution.

The watershed study was started through the efforts of Sam Wenger, a chemistry teacher at Manheim Central High. He wanted to give his students practical learning experience and ignite their interest. In 1973, he began taking them outdoors to study Chickies Creek.

In this outdoor classroom, the students learn how to make different kinds of water quality measurements, and then deduce why certain chemical



Manheim Central High School students collect samples with dip nets at Chickies Creek. By identifying the different types of aquatic insects and invertebrates and classifying them according to their tolerance to organic pollution, the students can determine water quality.

Photo courtesy of the *Sunday News*, Lancaster, Pa.

A Chemistry Class Helps SCS

Since 1977, the students of Manheim Central High School have been helping the Soil Conservation Service in planning a watershed project for Chickies Creek. The chemistry students' data are being used by SCS to monitor water quality conditions.

During the early 1970's, the local people had identified a flooding problem in the Borough of Manheim, which is located at the downstream end of the 23,000-acre watershed. Representatives of the Lancaster Conservation District and Manheim Borough, and Lancaster County Commissioners were not only concerned with preventing floods but also with reducing the effects of

reactions and conditions exist.

"Streams provide an excellent measure of the environmental quality of our community," reflects Wenger. "This program is designed to enable the student to relate chemistry to present and future realms of experience, and to have a positive feeling toward chemistry."

Wenger further explains the practical side of the course. "The students are asking the questions, and then discovering the answers by actual demonstration or onsite experiment."

One of their first discoveries was the fluctuating presence of dissolved mineral particles in the creek. The students used an electronic meter to run a current between two probes held in the water. This test measured the degree of

resistance to the conductivity of electricity. Knowing that specific conductivity increased with the pollution level, the students were able to identify those portions of the stream containing chloride.

The students then traced the source of chloride pollution to the runoff from salt applied to snow-covered roads. This exercise of scientific method and logic gave the students an opportunity to understand the cause and effect principles governing their environment.

The students have conducted over 10,000 water quality tests since 1973. They test for suspended solids; levels of dissolved oxygen, nitrogen, phosphates, and acidity; temperature; and volume flow. They then doublecheck

their results by examining the aquatic insect population which is one indicator of water values.

Word has gotten around at Manheim Central High that you not only learn in the chemistry classes, but that you can also have a good time. Students are becoming more aware of their immediate surroundings as they examine the streams around their own homes. They want to see why things happen and begin to pick up on subtle land use changes in their community.

How do the students feel about the course? One student's evaluation best describes their learning experience: "I think we are learning more by discovery than by being told about it."

agricultural activities on Chickies Creek. They applied to SCS for help and became sponsors of a project under Public Law 83-566, Watershed Protection and Flood Prevention Act.

SCS studied the causes and frequency of flooding, and estimated the dollar damages. The next step was to propose alternative solutions, such as dams, dikes, channel modifications, or floodproofing buildings.

In weighing the benefits of each alternative, SCS needed to determine their impacts on the watershed. This requires data on the stream's chemical, physical, and biological conditions. SCS looked for existing sources of information and turned to

the long-term monitoring project at Manheim High.

Eager to cooperate, the chemistry class is now coordinating its activities with the watershed project, having modified its testing to meet SCS's needs. The students will continue to work at 10 sampling stations monitoring 13 water quality values.

The chemistry classes of Manheim High will prove invaluable in helping SCS evaluate whatever flood prevention measures and soil conservation practices are installed. The students, in turn, will take part in a unique learning experience.

Mr. Heaslip is wildlife biologist, SCS, Harrisburg, Pa.

Life at Bald Rock

by Charles T. Mathews
and Morris S. Gillespie

A segment of outdoor learning at Bald Rock includes listening to music in nature. Students discuss insect and animal sounds and their musical interpretations.



The 80-acre Bald Rock environmental study area in Randolph County, Ala., has been the scene of learning activities for a good many future teachers and elementary school students for about 10 years.

Southern Union Junior College at Wadley started the environmental education program to help future teachers gain a better understanding of nature as well as experience in working with youngsters in outdoor learning situations. In 1972, the Bald Rock area was designated a National Environmental Education Landmark (NEEL) by the U.S. Department of the Interior. Among the requirements of NEEL projects was an established and ongoing environmental education program at the site.

Bald Rock takes its name from the bare, igneous, large-grained granite rock formation. According to geologists, the granite cooled under the surface when it was formed and later was uncovered by erosion. Many unusual plants grow in cracks between the rocks or in small patches of soil. A stream flows through the study area, and there are swamps and forests of cedar and pine. Wildlife includes snakes and lizards common to the area, wild turkeys, raccoons, possums, and rabbits.

Mary Cu Shivers, a biology teacher at Southern Union Junior College, uses the area extensively in her teaching. She requires her students to teach environmental education to elementary school students from seven surrounding counties each year.

"The Bald Rock study area is the best I have seen for teaching biology," said Shivers. "It has a variety of unique plant and animal life. More than 20 different mosses and many kinds of li-

chens have been identified in the area."

The site is privately owned, but Shivers and other local educators saw the potential for environmental education. The landowners agreed to protect the area from development and to use good forest management when cutting timber outside the study site. Through the Randolph County Soil and Water Conservation District, the Soil Conservation Service provided soil information for developing the nature area and helped identify some of the plant life. SCS also furnishes teaching materials to educators.

As part of their course work, Shivers' college students develop 5-minute lesson plans to use with the elementary school students at Bald Rock. The student teachers work in groups of two with about 10 children in each session. About 150 elementary school students can be taught in 1 day. More than 400 area students in grades 4 through 6 visit the learning center each year.

The student teachers guide the children along one of the 1½-mile nature trails that wind through the area. They stop at individual learning stations where they investigate the natural selection of plants and how wildlife fits into nature's pattern. They study the role of fungi, and how pollution affects the soil, water, and air. The students follow a food chain from one-celled animals to man and learn the value of plants in the food chain. They also find out how rock breaks down to become soil.

At one of the learning stations, students listen to music in nature. They discuss insect and animal sounds and the musical interpretations of the sounds. At another site, they test water quality in the stream that runs through well-managed timberland before reaching

the study area and compare it with water brought in from a stagnant pond.

"My college students love teaching the outdoor classroom section at Bald Rock and they benefit as much as the children who are in the sessions," said Shivers. "The most popular session is the one on edible wild foods. We prepare poke salad, sassafras tea, fried dandelion flowers, and cattails."

"The college students do an excellent job of relating to the elementary school students," said Joanne Jordan, director of extended day programs at the college. "Several educators have recognized the benefits of the program and are on the list to bring classes to Bald Rock every year. Several of Shivers' former students, now teaching in the vicinity, bring their classes to the area."

"The children look forward to this trip and it works well with our science schedule," said Alva Jean Arrington of the Woodland School System. Nancy Carolyn Wallace, also from the Woodland system, said, "It's the highlight of the school year for the fourth graders. They look forward to the trip and to learning about the environment."

"The students are motivated to learn when they can experience nature firsthand," said Dorothy Rice of the Wedowee School System. "They remember what they learn at the Bald Rock environmental study area much better than what they learn in the classroom."

John Sartain, an elementary teacher at the Alabama School for the Deaf, said that the school has taken a busload of students to the Bald Rock area for the past 4 years. "Usually at least one student teacher in each group has learned to finger spell," said Sartain. "They learn some of the easier signs and some of the alphabet and the chil-

dren appreciate the college students taking the time to learn to communicate with them," he said. "Participating in the program is a good activity for the deaf because there are many things for them to see and do. They especially like the session on making food and drink from plants."

Shivers said that about half of her biology students are studying to become teachers, and through the teaching experience at the Bald Rock environmental study area, some of them have decided to go into working with handicapped children.

Mr. Mathews is district conservationist,
SCS, Wedowee, Ala.

Mr. Gillespie is public information officer,
SCS, Auburn, Ala.

The Jim Hamm Nature Area

by Eldie W. Mustard
and Carrol Hamon

An asphalt trail used for jogging also provides easy access to the nature area for the handicapped and elderly.



Islands were built in "Jim's Pond" to provide nesting sites for waterfowl.



Where a young boy once explored the outdoors on his parent's farm and played on the shores of a big pond, many children now enjoy the same experiences in a nature area dedicated in his memory. Captain James Hamm was reported missing in action in the Vietnam War on March 14, 1968. As a living memorial to their son, his parents, Richard and Emma Alice Hamm, donated 24 acres of their farm to the city of Longmont, Colo., to be used as an environmental study area by the St. Vrain School District.

The Longmont City Council accepted the gift and turned the land over to the Parks and Recreation Department for developing and managing the nature area. A planning committee was named which included Emma Alice Hamm and representatives from the school district, local service organizations, and the Soil Conservation Service.

As the first step in planning, SCS, the Longmont Audubon Society, and the Longs Peak Garden Club prepared a series of natural resource inventories of the site that included soil information, lists of wildlife, and vegetation most suited to the area. The planning committee also consulted teachers in the St. Vrain schools to find out how they could best use the area to teach students about the environment.

Using donations from the Hamm family and others as matching funds, the Longmont City Council applied for U.S. Department of the Interior Heritage Conservation and Recreation Service Land and Water Conservation funds through the Colorado Division of Parks and Outdoor Recreation. The city received \$20,000 for use in developing the Jim Hamm Nature Area. The Colorado State University Recreation De-

partment prepared the final plan.

The Longmont Chapter of Jaycees adopted the nature area as one of their service projects, working on weekends and obtaining materials and the use of equipment as donations or at reduced prices.

In donating the land, the Hamms had stipulated that a boundary fence must be installed around the nature area to separate it from adjacent private property. The planning committee suggested that a living fence would be more appropriate than steel and wire. The Hamms agreed, and a five-row tree and shrub planting was installed along the north and west sides to attract wildlife, serve as a windbreak, and separate properties. SCS helped select the trees and shrubs, such as Hansen rose, honeysuckle, sumac, Russian-olive, and honey locust. A pole fence borders the rest of the area.

The nature area pond, known locally as "Jim's Pond," is about 8 acres in size, and had once been used as an irrigation reservoir. Now, it is surrounded by plains cottonwood, Chinese elm, hackberry, willow, and wild plum trees that shelter many kinds of wildlife. Five islands, each about a quarter of an acre, were built in the pond to serve as nesting sites for waterfowl and shorebirds. Canada geese nest in the marshy vegetation on the islands, and blackbirds, mourning doves, and ducks are part of the scene. Also at the pond, a 20-foot boardwalk extends into a marshy area that is too wet to support a hard-surfaced trail, enabling students to observe and study the plant and animal life there without trampling the edge.

A three-sided wooden structure surrounded by vegetation provides a blind from which students observe and pho-

tograph wildlife. Winding along the shore of the pond and through the nature area is an asphalt trail to provide easy access for the handicapped and elderly. Other special features are an old-fashioned hand pump and samples of grasses and other plants common to Colorado's eastern plains. A small amphitheater built in a natural depression of materials found in the area seats 30 to 40 people and can be used for discussion groups or for special lectures.

SCS helped select the site for the observation blind, designed the trail system to avoid erosion and water hazards, and helped develop the picnic area. SCS also uses the nature area for training teachers and agency personnel in planning outdoor classrooms.

The St. Vrain School District published two manuals of activities that teachers can use to heighten their students' awareness of the environment. In one activity, eight students position themselves around a tree. Each of them uses two words to describe the tree and they write down each other's words. Each student then uses all the words in a poem about the tree.

In another learning project, students observe how different animals are suited to different habitats. The children make animals that could live in the nature area using carrots or potatoes for the body and collecting pebbles, twigs, berries, leaves, and other materials to make the rest of the animal.

Fourth through sixth grade students study water, land use, and soil. They note the life cycles of ducks, fish, and other wildlife and how weather affects animals. The school district also uses the nature area for its Junior Naturalist Program in which junior high school students lead special field trips for

younger children. At one site on the tour, the children pretend that they are an animal that lives there. They have to decide what they would eat and where they would find shelter.

According to Quentin Baker, science coordinator for the St. Vrain School District, the Jim Hamm Nature Area is especially valuable to the school district's environmental education program because of its diversity and its proximity to the city of Longmont. "With the energy situation, we needed something close by for outdoor studies," said Baker.

The Jim Hamm Nature Area serves the schools of Longmont well. It is a tribute to a young man who spent his boyhood on the shores of Jim's Pond and who gave his life in the belief that others should enjoy the same freedoms that he enjoyed.

Mr. Mustard is State biologist,
SCS, Denver, Colo.

Mr. Hamon is district conservationist,
SCS, Longmont, Colo.

With One Good Example

by James L. Harder

"Many farmers and ranchers take a long time thinking about applying our conservation suggestions and rightfully so, since it's money out of their pockets to pay part of the cost," said Robert Tucker, soil conservation technician with the Soil Conservation Service in Pierce County, Nebr.

"Leonard Hoffman, the only Long Term Agreement participant in the county, took his time, too. But once he knew what he wanted to do and had the money to do it, SCS designed one practice after another for him," said Tucker.

Hoffman began farming in northeast Nebraska in 1943 with his father. "At that time we farmed around some pretty deep gullies in our fields," Hoffman said. "My father had the gullies filled in, but we continued to lose a lot of soil from runoff. We had a hard time getting the gullies to heal right.

"In the mid-1960's, our neighbor built gradient terraces on a big hill which drains across our land," Hoffman continued. "Runoff from this hill was a big factor in causing a gully on our property. Once those terraces were in, I could tell there was less water running into our fields."

When Hoffman began operating the farm on his own in the early 1970's, he made a visit to the local SCS office. His first questions were about shaping, straightening, and establishing a grassed waterway for a ditch on his land. At this time, he signed up to become a cooperator with the Pierce County Soil and Water Conservation District (now the Lower Elkhorn Natural Resources District).

Financial priorities held back Hoffman's conservation planning and application. It was the winter of 1974 before he could see his way clear to begin con-

struction of SCS-designed practices.

"SCS assisted Leonard with developing a conservation plan for his 600-acre crop and livestock farm," said Tucker. Soon afterwards Hoffman signed his Long Term Agreement (LTA) with the local office of USDA's Agricultural Stabilization and Conservation Service. An LTA guarantees farmers or ranchers that a set amount of cost-sharing money will be available to them each year for up to a 10-year contract.

"Since Leonard signed the LTA, we have done a lot of work on his farm," Tucker said. "In 4 years we have laid out 18,300 feet of parallel terraces, 5.3 acres of grassed waterways, 1.1 acre of farmstead windbreak plantings, 30 acres of native grass pasture seeding, one erosion control dam, 1,200 feet of diversion terraces, and 96 acres of irrigation water management."

After a heavy rain in early summer 1977, Hoffman checked the first hill he had terraced to see how it had held up. A diversion had been built at the bottom of the 400-foot hill, which had a 14-percent slope, to protect the sprinkler irrigated bottom. "I could hardly believe it," said Hoffman. "There wasn't enough water coming off that hill to make it to the bottom.

"This past spring I put in another 3,440 feet of parallel terraces and a stock water pond. I still plan to put in more terraces, waterways, and another erosion control dam," Hoffman continued. "When I get all those projects in, the place should be looking good and doing a good job of protecting against erosion."

"We estimated that the annual soil loss on Leonard's farm was about 15 tons per acre before he began installing

conservation practices," explained Tucker. "Now, using conservation tillage, a different crop rotation system, and with the terraces, he has cut soil loss to about 4 tons an acre each year."

After farming the parallel terraces for a year, Hoffman said, "Even though the terraces are built parallel, I still have to get used to planting on a curve. Parallel terraces take a little longer to farm, but it's worth it to protect the soil. The slopes where the pushup terraces were built are now easier to farm in a way, too, because of the level bench effect below each terrace."

"Terraces are not easy to 'sell' in the deep rolling silt loam soils of northeast Nebraska," explained Tucker, "but when you have a person like Leonard Hoffman setting an example, hopefully others considering practicing conservation will soon follow."

Mr. Harder was district conservationist, SCS, Pierce, Nebr., and is now district conservationist, SCS, Beaver City, Nebr.

Looking Out for Wildlife

by Gary Gross

The Victor Richter family of Burleigh County, N. Dak., is proving that farmers can successfully run a dairy operation, provide food and cover for wildlife, and leave the land in better shape than they found it. The Richters want future generations to be able to enjoy the land and the wildlife—such as deer, pheasant, grouse, partridge, and an occasional moose—that the land supports.

In 1962, the Richters became cooperators with the Burleigh County Soil Conservation District and also signed a contract under the Great Plains Conservation Program. With technical assistance from the Soil Conservation Service, the family has been putting various conservation practices on the land ever since.

Victor's dad, John, initiated the "conservation way of life" on the farm back in 1940 with multiple-row tree plantings.

"These plantings," John said, "are the finest game shelters imaginable, offering year-round protection for upland game, including deer."

The 12 acres of farmstead windbreaks include plantings of Siberian elm, green ash, caragana, cottonwood, and Russian-olive. The field windbreak plantings include 14 miles of Siberian elm, green ash, American elm, caragana, and dropmore elm.

The Richters' 1,880-acre farm includes 800 acres of cropland which is on a rotation of 1-year corn, 1-year oats, and 5-years alfalfa. The family also practices stripcropping to control erosion from runoff water.

On their rangeland they use a pasture rotation system and have installed crossfencing for better control of their cattle.

The Richters have developed two

Wildlife ponds and plantings attract many kinds of wildlife to the Richter's North Dakota farm.



livestock watering ponds, three watering ponds for livestock and wildlife, and eight shallow watering ponds for wildlife only, some as large as 50 by 200 feet.

Wildlife plantings have been established close to watering facilities. They include fruit trees such as plum, golden currant, junberry, chokeberry, and Russian-olive; evergreens such as eastern redcedar and Rocky Mountain juniper; and crabapple, honeysuckle, Nanking cherry, and sandcherry. Buffaloberry and cottonwood have been left for additional wildlife food and cover.

The Richters also plant 5 acres of corn for deer every year and leave some alfalfa for nesting cover.

During the winter, numerous silage piles can be seen along the road by the Richter farm. "I like to dump a few small piles of silage along the road when I'm feeding my dairy cattle," Victor explained. "This helps the pheasants and the deer winter a bit better, especially during winters like the past one when

ice forms a hard crust on the snow."

One project that is the pride and joy of Mrs. Richter and the children is the raising of pheasants for their own use and for release around the area. The chicks are flown in from Wisconsin within 12 hours of birth, around the first of June. They are then fed on a 30 percent protein diet until September when they dress out at 2 to 3 pounds each.

"Every year is a learning experience with these birds," Victor said. "Our biggest problem is predators, so we keep a radio going constantly to keep them away."

The pheasant project has been so successful that the Richters are thinking about doubling the size of their flock.

The Richter family's farm is a good example of how conservation practices benefit farmers as well as wildlife.

Mr. Gross is district conservationist, SCS, Bismarck, N. Dak.

A Lush Valley Assured

Clean Water Models, Part 2

This is the second part of a series on the seven Model Implementation Projects (MIP's) going on throughout the United States (see the October 1979 issue, p. 4). The MIP's are a 3-year test to demonstrate how concentrated cost sharing and technical assistance by the U.S. Department of Agriculture and the U.S. Environmental Protection Agency can help solve agriculture-related water quality problems. The Indiana and Washington MIP's are described here.

by Steve Foland

Little clouds of dust follow walking feet in the Rattlesnake Hills in south-central Washington. The hills and the Yakima River Valley they overlook receive only about 7 inches of precipitation a year. The view to the west from the hills, however, is over the lush green Yakima Valley, which is irrigated, and the snowcapped Mount Ranier 95 miles away in the Cascade Range.

About 300,000 acres of the South Yakima Conservation District were chosen by the U.S. Department of Agriculture and the U.S. Environmental Protection Agency last year as the site for a Model Implementation Project (MIP). The area, which surrounds the town of Sunnyside, supports abundant apple, pear, cherry, prune, apricot, and peach orchards; vineyards; fields of corn, hops, asparagus, grain, and mint; and pastures for horses, sheep, and cattle.

Nearly all of the water for the crops is provided through irrigation districts. Five dams on the Yakima River trap the water in reservoirs upstream in the Cascade foothills and mountains. The water is released from the reservoirs into the river during the growing season. Dams at varied points along the river divert the water into canals that traverse the slopes of the hills on the contour for as much as 90 miles. Two such canals, the Roza and the Sunnyside, run through the south Yakima MIP area.

The Roza Canal runs along the sides of the Rattlesnake Hills. To stay at the same gradient or slope, it turns into or bridges the natural drainageways and runs around or cuts through the ridges between the drainageways. Some of the water from the Roza is pumped farther up the hillsides for irrigation. Most of the water, however, flows by gravity from the canal and irrigates lower-lying fields.

The Sunnyside Canal runs at a lower elevation and irrigates the more level land between the Roza Canal and the Yakima River. The Sunnyside carries much more of the area's silty soil than the Roza. This is because some of the tailwater from the Roza lands that is not used by the crops or that does not evaporate runs into the Sunnyside Canal carrying eroded soil particles with it.

Although both canals have their sources in the Yakima River and both canals drain into the river, entire towns, hills, ranches, and farms separate the canals from each other and from the river. The large quantities of water released from the canals run over the intervening land and have the potential to pollute the Yakima River and its tributaries with sediment, chemicals, and pesticides.

An area of 64,000 acres was designated as having the greatest need for conservation practices. Within the 64,000 acres, two areas of 11,000 acres each were designated as priority areas. These two areas are located on irrigated land on the sides and at the base of the Rattlesnake Hills. The remaining 42,000 acres may receive MIP assistance as time and resources permit.

Priority area I, the land most in need of conservation treatment, is in the northeastern part of the MIP area around the upper reaches of the Sulphur Creek drainageway. The area has long been a source of sediment pollution in the Yakima River. A South Yakima Conservation District steering committee of local farmers decided that cost-share money and technical assistance would be concentrated in priority area I during the first year of the MIP. Money and assistance is now being concentrated in priority areas I and II.

According to MIP District Manager Cliff Eckhardt of the South Yakima Conservation District, the district involvement, the money, technical assistance, and information and education program provided to landowners in the Sulphur Creek drainage area, along with voluntary practices and management initiated by the farmers, should, by the end of the year, significantly reduce the amount of sediment reaching the Yakima River through the creek.

"If we could just get away from furrow irrigation and into sprinkler irrigation on the steep slopes," said Soil Conservation Service Project Leader Ken King, "we would be a long way toward having the problem licked." King pointed out that 4,500 acres of prime farmland in the MIP area has the potential for operating under gravity-pressurized sprinkler irrigation systems.

"Sprinkler systems are virtually nonerosive if the water applications do not exceed the soil's ability to take in the water," said King. "And the energy saved by gravity feed could be enormous. Many operators would not have to pump at all, and many others could reduce the horsepower of their pumps."

Many other practices for best managing irrigation water are being recommended, cost shared, and installed in the MIP area. The lengths of furrow irrigation runs are being shortened. Operators are wetting the soil before the first irrigation of the season to hold down the serious erosion that occurs when water runs rapidly over dry soil. Grassed filter strips are being established or maintained along waterways to reduce the sediment load in the water and at the tails of

Cattails flourish in a sediment retention basin at the foot of a new vineyard. The sprinkler system brings the desert soil to life but does not cause severe erosion.



furrow runs to filter out sediment. Sediment retention basins are being installed, and pump-back systems are being used to save water, to prevent sediment from leaving a farm, and to return some sediment to the fields from which it came.

All in all, the water management practices being installed and used in the Yakima Valley should make the area an ideal model for irrigation farmers and ranchers everywhere. Each practice is designed to conserve the area's precious water, to insure an abundant crop yield, and to reduce erosion and the sediment pollution that accompanies erosion.

Mr. Foland is chief, conservation news and reports branch, SCS, Washington, D.C.

Automated Pollutant Nabber

by Joe B. Hays

Sophisticated stream monitoring devices, along with computers, are simplifying water quality analysis in the Eagle Creek and Stotts Creek watersheds in central Indiana. The two watersheds make up the Indiana Heartland Model Implementation Project (MIP)—a special demonstration in reducing nonpoint source pollution from agricultural land.

The Eagle Creek and Stotts Creek watersheds were selected for the project from 79 other watersheds in the Heartland Region. The major emphasis in the Heartland MIP is on reducing the amount of sediment and other pollutants related to farming that are washed into the creeks each year.

In 1978 and 1979, USDA's Agricultural Stabilization and Conservation Service (ASCS) obligated \$600,000 in Agricultural Conservation Program cost-share funds to help farmers in the MIP area apply "best management practices" (BMP's) to their land. BMP's are the conservation practices recommended by the Soil Conservation Service to be the most effective and practical means for controlling nonpoint source pollution. Some of the BMP's that farmers in the Heartland Region are applying include conservation tillage, terraces, sod waterways, critical area treatment, sediment basins, and animal waste control facilities.

The effectiveness of the BMP's will be analyzed by a computer modeling program called "ANSWERS." Directed by Larry Huggins and David Beasley of Purdue University, ANSWERS can simulate field and weather conditions and estimate soil loss under a variety of different farming practices. Sediment predicted by the computer's storm events will be verified by data from stream monitoring stations in the Eagle Creek and Stotts Creek watersheds.

To monitor the streams researchers from Purdue University are using automatic stream samplers and special freezer units to store up to 80 water samples at sites in each watershed during storm events. Some water quality characteristics such as temperature, stream flow, acidity or alkalinity, and oxygen levels are monitored continuously and the data are transferred to the computer by telephone. "Given the short duration of the MIP, only 3 years," said Huggins, "ANSWERS will help quantify the water quality effects of different BMP's."

A land use computer profile of the area is being provided by the Holcomb Research Institute at Butler University in Indianapolis. In addition, the aquatic life in the streams is being studied by James Gammon of DePauw University's Zoology Department. The various research activities are

David Beasley (left) of Purdue University explains the flow measuring weir on Stotts Creek to Joe Hays, SCS soil conservationist and MIP coordinator.



being supported by funding from the U.S. Environmental Protection Agency.

Angela Preston, MIP coordinator with the Indiana Heartland Coordinating Commission (IHCC), said, "Evaluation of the project is a unique research effort involving three universities and local public participation."

Also unique in the Heartland project is the coordination between U.S. Department of Agriculture agencies and IHCC, which is the areawide water quality planning agency in central Indiana. The project is a team effort involving agencies and organizations in six counties. They include the local soil and water conservation districts, the Science and Education Administration-Extension, SCS, ASCS, and the Indiana Department of Natural Resources. A special MIP Local Policy Group reviews the research and helps direct the project.

With help from their sophisticated monitoring system, conservationists in the Indiana Heartland are working to show landowners that BMP's can and do reduce sedimentation and pollution in streams, rivers, and lakes.

Mr. Hays is a soil conservationist, SCS, Indianapolis, Ind.

"Mystic Mountain" Gives Players Practice in Land-Use Planning

"Mystic Mountain" is a new land-use planning game that challenges players to come up with a series of land-use plans that will meet continually changing national needs for timber, recreation, and other forest resources. The game condenses 75 years of the future of the hypothetical "Mystic Mountain National Forest" into 4 hours of playing time.

In the first part of the game, teams of two or three people determine what portions of Mystic Mountain should be developed, logged, or preserved over the next 15 years. In the four playing periods that follow—each representing 15 years—they make further decisions about what to do with the land. As they move from one planning period to the next, players may be faced with a new "scenario" of national conditions.

"The game stresses that the future is uncertain," says one of its developers, researcher Edward C. Thor of the Pacific Southwest Station's Land-Use Planning Unit in Berkeley, Calif. Players who plan for an uncertain future, preserve enough options to meet changing demands, and realize that some activities in some locations cut off more options than others, will be winners in the "Mystic Mountain" game and will probably be winners in real-life land-use planning as well.

Details on the game, along with a game map, set of rules, and instructions for the leader, are in the publication, "Mystic Mountain: an educational alternative futures wildland planning game," by Edward C. Thor and James L. Creighton (General Technical Report

Meetings:

November

4-7	The Irrigation Association, Marco Island, Fla.
5-8	The Geological Society of America, San Diego, Calif.
5-9	National Adult Education Association, Boston, Mass.
7-9	Future Farmers of America, Kansas City, Mo.
11-14	National Agricultural Bankers, Salt Lake City, Utah
11-14	National Association of State Universities and Land Grant Colleges, Washington, D.C.
11-14	National Forest Products Association, Palm Springs, Calif.
12-20	The National Grange, Lancaster, Pa.
15-16	National Conference on Soil Conservation Policies, Washington, D.C.
25-29	American Institute of Chemical Engineers, San Francisco, Calif.

December

2-5	American Society of Farm Managers and Rural Appraisers, Inc., Chicago, Ill.
3-7	American Geophysical Union, San Francisco, Calif.
3-7	Symposium on Surface Mining Hydrology, Sedimentology and Reclamation, Lexington, Ky.
4-7	Western Forestry Conference, Spokane, Wash.
6	Keep America Beautiful, Inc., New York, N.Y.
10-14	American Society of Agricultural Engineers, New Orleans, La.
28-30	American Agricultural Economics Association, Atlanta, Ga.

January

3-8	American Association for the Advancement of Science, San Francisco, Calif.
6-10	American Farm Bureau Federation, Phoenix, Ariz.
7-11	North American Game Breeders and Shooting Preserve Association, Orlando, Fla.
13-14	Land & Water Conservation Exposition, Des Moines, Iowa
17-21	National Wool Growers Association, San Diego, Calif.
21-25	National Cattlemen's Association, San Diego, Calif.

PSW-30-FR18). Single copies are available without charge from the Pacific Southwest Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service, P.O. Box 245, Berkeley, Calif. 94701.

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AGR 101



RCA

Responding to the requirements of the Soil and Water Resources Conservation Act of 1977 (RCA), the U.S. Department of Agriculture is progressing with its appraisal of the Nation's non-Federal soil and water resources, developing a national soil and water conservation program, and preparing a statement of policy concerning these resources.

During the summer and fall of 1979, several important RCA activities took place.

Draft Appraisal Part I

On September 4th, Draft Appraisal Part I, the first of four RCA documents, was released for public review. Draft Appraisal Part I analyzes the status and condition of soil, water, and related resources—wetlands, riparian vegetation, fish and wildlife habitat, windbreaks, organic residues, and recreation. The information on the quantity and quality of these resources is supplemented with statistical data on land and water, land capability, dominant soil conditions, and major uses of non-Federal land.

Part I of the 1980 Appraisal also contains an inventory of legislation and regulations dealing with resources and discusses the impact of technology on agricultural production and conservation. In addition, it identifies resource areas that concern the public and compares these concerns with available data on conservation problems.

Response Analysis Center

A major component of the 1979-80 RCA process is the analysis of public written comments received in response

to RCA document contents and comments received at the regional meetings being planned during the 60-day public review period later this winter. A special temporary office has been set up to accept and handle public responses. The Soil Conservation Service has obtained space at the U.S. Navy Supply Corps School in Athens, Ga., for use as the RCA Response Analysis Center (RAC). At the center local citizens will be hired and trained to handle the responses in a manner required to successfully capture public reaction to RCA document contents.

Manly Wilder, SCS Deputy State Conservationist in Pennsylvania, was named RAC director. Additional SCS staff from around the country will be detailed to the center to supervise response coding, quality control, and other functions.

Public Briefings

Public briefings were held in Washington, D.C., in August and September to familiarize news media, national organizations, and interested citizens with RCA. Major agenda items included discussion of conservation objectives and alternative programs being considered. M. Rupert Cutler, Assistant Secretary for Natural Resources and Environment, conducted the briefings.

To Come

Forthcoming RCA activities include publication and distribution of the final three RCA documents; the 60-day public review period; and the regional meetings allowing the public to react to RCA and document contents.



Soil Conservation

December 1979

U.S. Department of Agriculture

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The Action Eighties

From the Administrator

A recent adult-education catalog listed, among its "leisure" courses, "Issues for the Eighties."

The 1980's are here!

The issues must be dealt with—and not very leisurely.

The Soil Conservation Service and conservation districts want to make this next decade the *Action Eighties*.

As several major conferences on the future have suggested, what we do in the 1980's will determine what kind of society America will have in the years extending to 2030—and beyond. Recommendations and actions under the Soil and Water Resources Conservation Act will contribute to this future.

Conservation and management of *all* natural resources are essential to our survival as a Nation. All of us in the soil and water conservation movement share a tremendous public responsibility. To assure a permanent agriculture, and to meet America's many other needs, we must keep our natural resources at a high level of productivity, while keeping our environment healthy and beneficial.

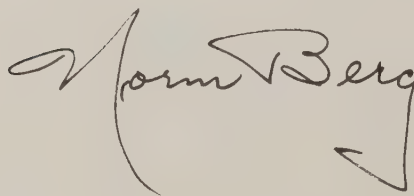
In the 1980's, bold action programs will be needed for:

- Conserving soil and protecting water quality;
- Conserving water and making better use of it;
- Conserving energy and improving its use;
- Strengthening pasture, range, and forest resources;
- Retaining and improving farmland, especially the prime and unique lands and others that local and State groups consider important;
- Building a stronger, more self-sufficient rural America;
- Protecting wetlands and managing flood plains;
- Developing aquaculture for better nutrition and alternative sources of farm income;
- Enhancing fish and wildlife habitat;
- Protecting and enhancing the visual resource;
- Improving assistance to—and opportunity for—minorities, women, and disadvantaged citizens; and
- Helping local and State governments develop and strengthen their conservation programs.

These individual efforts will need to be coordinated toward the overall goal of an improved environment.

Such an all-encompassing mission is formidable. Yet the record of past accomplishment is clear. We can be even more effective in the 1980's. And we must.

Let us begin.

A handwritten signature in cursive script that reads "Norm Berg". The signature is written in dark ink and is positioned at the bottom of the page.

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Soil Conservation

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Cover:

Managing reindeer in Alaska is a huge task. Data from the Landsat satellite is helping Eskimos manage their herds. See article beginning on page 4.

Reindeer Range and the Satellite

by Burton L. Clifford

Five hundred and sixty-five miles above Alaska's Seward Peninsula, modern technology is updating one of humanity's oldest agricultural enterprises—raising reindeer. The Landsat satellite is producing images of the tundra ranges used by reindeer herds.

Alaska is often pictured as a wildlife paradise, and in some areas animals abound. But other areas—some as large as many States—have little or no game. Reindeer are a domestic substitute for wildlife caribou. From reindeer, Eskimos obtain meat and hides they need for food and clothing. They also manage the herds as a source of income, selling some of the tanned hides to tourists and the antlers to buyers in Asian countries who market them as an aphrodisiac.

Reindeer are similar to Alaska caribou, but they are not native to the State. The first reindeer were imported from Siberia in 1891 to provide sustenance for Eskimos after a natural decline in the caribou population. Several

Siberian herders and, later, Laplanders from Norway came to Alaska to help manage the herds.

By 1932, the herds had grown to over 640,000, but most of the animals were owned by nonnatives. In 1937, Congress passed the Alaska Reindeer Act, under which the Federal Government bought all reindeer, grazing rights, and handling and processing equipment owned by nonnatives. These were then distributed among the Eskimos and held in trust for them. Over the years, because of predation, disease, and inexperienced management, however, the herds dwindled to fewer than 30,000 animals.

In 1971, the Alaska Claims Settlement Act transferred more than 40 million acres to native ownership. The natives formed regional and village corporations to manage the land and investigate potential uses of their domain.

The NANA Development Corporation, a subsidiary of the Northwest Alaska Native Association, decided to enlarge

the reindeer herds within their region on the Seward and Baldwin Peninsulas and develop a market for the meat as an additional source of income. Managing the herd—and the range—is an enormous task, however.

During Alaska's brief summer, food is plentiful on the tundra. Reindeer graze on grasses, sedges, berries, and willow. But during the long winter season, reindeer must paw through the snow to reach lichens, the only available food. Since lichens grow at a tedious rate of only one-fourth inch a year, the herds must move constantly over a huge range to survive.

NANA asked the Alaska Soil Conservation District and the Soil Conservation Service for assistance and, for the first time, technology made it possible to develop adequate management plans for the tundra range.

Developing a plan for reindeer range in Alaska requires the same information as a plan for cattle range in the "Lower 48." Conservationists first inventory the

Reindeer are herded through a chute to a dehorning pen during spring roundup. Each reindeer will yield 3 to 4 pounds of antlers, providing one source of income for Alaska natives.

In developing management plans for the millions of acres of reindeer range, traditional "on-foot" resource inventories were impossible. The Landsat satellite, however, supplied needed information quickly and easily.



resources. They identify the plant communities and correlate them with soil types to define range sites. They then map the extent and location of each range site.

Range conservationists determine the amount of annual forage production for each range site. They compute the amount of forage necessary for ecological interests, such as protection of the resource base and dependent fish and wildlife, and the amount of forage available for sustained grazing. Based on this information, they compute optimum stocking rates and determine management practices for the herd and the range.

A traditional resource inventory on foot was out of the question—NANA's range covers 4 million acres. The Landsat satellite, however, supplied the information quickly and easily.

As the satellite passes over, photoelectric detectors on board record reflected light from ground details in a path 115 miles wide directly below the

satellite. The image is beamed to a ground tracking station, where it is recorded on magnetic tapes. The information is reassembled from the tapes and recorded on film by an electronbeam recorder. The information is gathered in four bands, and the resulting images can be combined with color filters to make color photograph-like images. These can be used at various scales for photo interpretation—delineating soils and range sites.

To verify the satellite data, a soil scientist, a range conservationist, and a Landsat imagery specialist flew into the roadless region by helicopter, setting down every 5 to 10 miles to check "ground truth." They completed the fieldwork in only 1 month at a cost of about 3 cents per acre.

Since the range surveys have been completed, SCS and the U.S. Department of the Interior's Bureau of Land Management developed management plans with the four range permit holders—totaling 4 million acres—in 1978

and surveyed another 4 million acres for plans in 1979.

Followup checks are essential for the management plans to work. Forage utilization surveys are made every year to check the regrowth of the lichens and to determine if the range is improving, deteriorating, or holding its own. This information is the basis for how soon reindeer can be returned to a given pasture, usually after 5 to 7 years' rest.

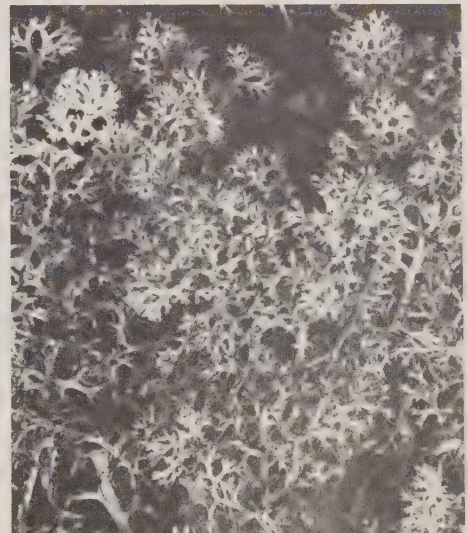
Forage utilization checks also are the basis for determining future stocking rates. The data coming in now indicate that the number of reindeer can be increased many fold. Through good planning and followup, Alaska can again develop a large red meat industry on its tundra ranges.

Mr. Clifford is State resource conservationist, SCS, Anchorage, Alaska.

Photos courtesy of the National Park Service and the University of Alaska.

During Alaska's short summer, food is plentiful on the tundra. But during the long winter season, reindeer must paw through the snow to reach lichens.

Lichens, or caribou moss, grow only one-fourth inch a year. For adequate protection, 5 to 7 years of deferred grazing are required.



Lake Michigan's Slips Are Showing

by Cheryl L. Rouse

The pounding waves push then pull against Lake Michigan's shoreline as they roll in and out. The water fairly shouts for attention and it is easy to blame for the gradual loss of banks along the shore. And yet some of the erosion results from the quiet insistence of surface runoff and underground seepage.

More and more people are finding the lakeshore a desirable place to build as did two Kewaunee County, Wis., professors. Their gray Cape Cod frame house sits atop the bluffs and flauntingly takes advantage of the view. At least it did for awhile. But rain fell on the house and garage roofs and ran down the asphalt driveway and over the edge of a bluff onto the bank. It wasn't long before the road was undermined and the vacation home in danger.

Each year the shoreline sneaks up on property owners along the lake. According to Soil Conservation Service District Conservationist Dave Gruber, "Sooner or later the erosion is going to get them."

Although urban buildup today compounds the runoff problem, glaciers skimming and re-laying soils for a million years, ending some 11,000 years ago, created the seepage problem. In the lakeshore area, a surface clay layer sits over a coarser, sandy layer referred to as a "sand lens." Below the sand lens is another clay layer. Ground water is trapped between the two less pervious layers and moves easily through the middle one. It comes out at the bank like a dripping faucet.

"This seepage keeps the soils continually wet so vegetation does not have a chance to get started," said Gruber. The water seeps out onto the soil weighting it so that it slips down the

bank. Eventually, the clay ledge is undermined and follows along behind.

The other part of the problem is the surface runoff that flows over the bank and tumbles its way to the bottom. "It does not take much of a watershed to cause a serious problem," Gruber commented. "Concentrated runoff water from just a few acres can rip the bank open 18 feet deep."

The first lakeshore stabilization was done by Don Bothé who at that time was chairperson of the Kewaunee County Soil and Water Conservation District. With the help of SCS Conservation Technician Clarence Mittelstaedt, he put in a gully control structure and a grassed waterway with tile, which fixed that runoff problem. Then in the late 1960's, he placed deep tile to intercept the seeps. Bothé and Mittelstaedt have encouraged other property owners to do the same.

Gruber says that it takes an intensive investigation to find out where the seepages are coming from. The sand layers

can vary from a few inches to 12 or more feet deep. To stop the dripping, tile must be placed at the top of the lower clay layer and parallel to the bank. According to Gruber, the maximum depth that tile has been placed is 12 feet. The tiling machine wheel will dig to 6 feet, but 4 to 6 feet more soil has been taken out with a bulldozer to get a little lower. The tile intercepts the water flowing toward the bank and carries it to the bottom of the bank.

To combat the problem of erosion from surface runoff, tile outlet terraces or diversions can be installed. The terrace, an earthen embankment along the bank's edge, keeps runoff from going over the bank. The water is directed to a low area in the terrace where an inlet tile carries it safely to the bottom of the bank.

Virgil Stangel, a property owner with more than 1,000 feet of farmland fronting Lake Michigan, has installed deep tile, terraces, and a gully control structure. Stangel remembers the places



At left, as more and more vacation homes are built along the shores of Lake Michigan, runoff from roofs increases. At right, erosion is accelerated when the runoff is funneled along a private drive over the edge of a bluff onto the bank.

where gullies started growing when he was a boy. They soon became deep and ugly. But today the gullies are gone thanks to an erosion control dam. The runoff was diverted to the dam which held it temporarily then safely lowered it to the bottom of the bank through a riser pipe.

The gully control structures, the deep tile, and the tile outlet terraces keep as much water as possible off the banks. When Stangel's banks dried out, he started planting crownvetch and birds-foot trefoil which finished off the stabilization project. He added trees and shrubs which provide food and cover for wildlife for a final touch. Eight years later the bank is green and growing—with no slips showing.

Ms. Rouse was public information officer,
SCS, Madison, Wis.

A tile outlet carries surface runoff from a surface inlet safely to the bottom of the bank, controlling erosion.



Water Harvesting by Wax

by Kirk G. Heaton

Wax apron catchments provide a new method of harvesting water for rangelands in the West. They can help many ranchers extend livestock distribution to areas without permanent water facilities.

Ranchers have used catchments to collect rainwater for many years. Generally, the cost of installation and maintenance for these systems has been high. But the new method—using paraffin wax to treat the ground surface—is one-third to one-tenth the cost of more common coatings such as asphalt, butyl rubber, and metal.

This method of harvesting water is currently in operation on the Arizona Strip, the dry, northwest corner of the State above the Grand Canyon. Dale Gubler and LeGrande Frei, owners of the G and F Ranch Corporation, installed a $\frac{3}{4}$ -acre wax apron on their land. They also used the hot-wax process to seal some natural sandstone catchments in other areas of the ranch.

Gubler and Frei have noticed a significant increase in water yield. "We are sold on the wax-treated catchments for our ranch and are ready to install them in other pastures," said Frei.

The $\frac{3}{4}$ -acre apron collects about 300,000 gallons of water during an average year, in an area where annual precipitation is 16 inches. This is more water than the ranchers can store, but it provides insurance for drier years.

A wax apron works best on sandy soils, such as those found on the Arizona Strip. Clay or finely textured soils cause maintenance problems and require a heavier application of wax because of the shrink-swell potential.

The apron was constructed by applying 2 pounds of wax per square yard to the soil surface. The paraffin wax, purchased in block form, cost 25 cents per pound. It was applied with special equipment provided by the USDI's Bureau of Land Management (BLM) through a work-trade agreement. This equipment included a boot tank in which the wax is melted and a hose and spray nozzle through which the wax is applied.

In addition to the wax, the owners had to rent a bulldozer to remove vegetation and rocks and to smooth the area. They used their own heavy truck to compact the soil. They also had to pay for labor to apply the wax, and la-

bor and materials to build a fence around the apron. The total cost of the apron was \$3,000.

The apron is connected to an 80,000-gallon steel storage tank with a 12-inch corrugated metal pipe. The tank, which cost \$8,000, is 36 feet in diameter, constructed from 12-gage, multiplate steel, and has a concrete bottom. The 10-foot-high tank is buried 7 feet to reduce evaporation, allow gravity feed from the apron, and permit easy filling from a water truck should supplemental water be required.

The storage tank distributes water through pipelines to troughs in areas adjacent to the catchment facility. Plans are underway to cover the tank with a butyl rubber, floating cover to reduce evaporation. The cover will cost about \$375. A 4-foot-high net wire fence was later installed on the edge of the tank to prevent animals from jumping into it.

Several agencies contributed to the installation of Gubler's and Frei's wax water-harvesting catchment. USDA's Agricultural Stabilization and Conservation Service provided cost sharing for installing the storage tank. USDA's Science and Education Administration's



At left, Shan Gubler sprays paraffin wax on bare ground for the catchment apron. At right, 6 months later, Shan's father, Dale, pours water on the apron as a test while LeGrande Frei looks on.



Water Harvesting

Water Conservation Laboratory in Phoenix, Ariz., and BLM have performed research and testing to develop the wax method.

The Soil Conservation Service issued interim standards and specifications for water-harvesting catchments, and provided technical assistance at each step of construction. SCS advises landowners on such aspects as soil sterilants, type of soil, catchment design, and potential problems with the site.

The wax water-harvesting catchment yields approximately 80 percent of total precipitation. The life expectancy is unknown, but some have been in use for over 5 years and have shown little deterioration when properly installed on suitable soil.

The wax-treated catchment is an important development with great potential. It opens up or "creates" new forage land and enables many States to increase their livestock production.

Mr. Heaton is district conservationist, SCS, Fredonia, Ariz.

Water harvesting is an agricultural practice which seals watersheds and increases runoff by making soil surfaces water repellent. One purpose for this practice is to provide water for livestock or wildlife in semiarid environments.

The water-harvesting catchment is the facility for collecting and storing precipitation and must be designed to suit the water requirements and the site conditions. The basic components of the catchment are an apron to collect the water, a conveyance system, and a storage basin.

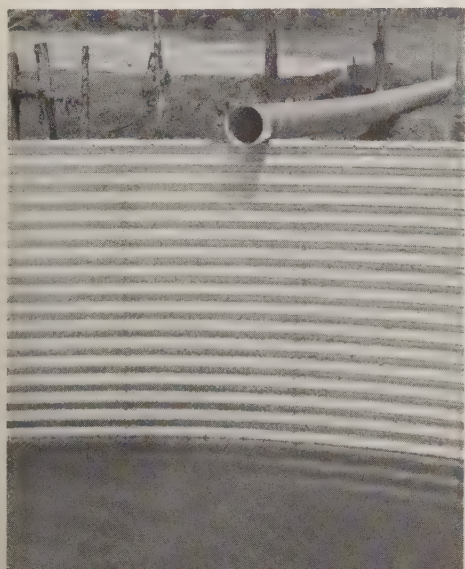
Many points are considered in designing a water-harvesting catchment. Design criteria include quality and quantity of water required; probability of filling the storage basin; adequate size, impermeability, and durability of storage basin; and the area of apron needed for the required water yield.

The apron must be smooth and impervious. Materials used to construct it range from earth, treated earth, wax, rubber, plastic, low-grade oils, asphalt, concrete, and steel. The

apron should be protected from damage by excess runoff by installing either an overflow pipe or emergency spillway.

Provisions should be made to protect the catchment, including: diverting foreign runoff and preventing excessive sedimentation; a sediment trap between the apron and storage basin; evaporation repressants in the storage basin; and fencing or some other method to prevent damage from weather, animals, vandals, wildlife, and traffic.

To further insure the efficiency of chemically treated catchments, the soil stabilizer, cellulose xanthate, may be applied. Cellulose xanthate is inexpensive because it is made from waste paper. It is treated chemically to be water soluble, and then sprayed on the apron. It penetrates the soil and, in the drying process, binds the soil particles together. The soil stabilizer prevents erosion and cuts down on the amount of wax or other precious petrochemicals used in water harvesting.



Even before the wax apron was completed, rain had partially filled the 10-foot-deep storage tank. After the apron was completed, a 4-foot-high fence was installed to prevent animals from jumping into the tank.

Gentle Hands Harvest Rare Seeds

by Steve Foland

The vast Texas range surrounding Abilene at one time supported a variety of perennial woody plants that provided excellent food for domestic animals and food and cover for wildlife. After being exposed to more than a century of intensive grazing by domestic livestock, many of these palatable forbs and shrubs have become so rare as to be true novelties among the mesquite and prickly pear.

Adequate quantities of seeds for the once abundant plants have been unavailable because of the difficulty in mechanically harvesting the very small seeds. Over the years, range and plant

materials specialists have had to concentrate on the more easily harvested seeds from domestic grasses for their seeding mixtures.

In the spring of 1976, the staff of the Abilene State School decided that harvesting the woody plant seeds would provide excellent horticultural training and therapy for the mentally handicapped residents of the school. School officials contacted the Middle Clear Fork Soil and Water Conservation District and, in May, signed a cooperative agreement with the district and the Soil Conservation Service.

The three-way agreement provided

for the SCS plant materials center in Knox City, Tex., to supply the school with forbs and shrubs. The school would provide the land for growing the plants and the labor for cultivating the plants and harvesting the seeds. The best seeds would be sent to the plant materials center for inclusion in range seeding mixtures. The mixtures are used in field plantings throughout Texas for livestock and wildlife consumption.

Walter Driesner, on the State school staff, adopted the project as an "on-the-job hobby" and began keeping meticulous records of the plantings and harvests. In 1978, Driesner's records showed that the students harvested 50 pounds of the rare littleleaf leadtree seeds.

SCS District Conservationist Kenneth Cash, who provided technical assistance for the project, emphasized the dedication required for handpicking the tiny seeds. "It can take three people as long as 20 minutes to harvest the tiny seeds from a single branch of a shrub," said Cash. "The participants in this project have the patience for the job; they like to think of themselves as plant rescuers."

Thus far the students have "rescued" such native plants as skeletonleaf gold-eye, Texas peachbrush, smallflower peachbrush, Wrights pavonia, littleleaf leadtree, and Wrights anisacanth. Their dedication is paying off.

Mr. Foland is chief, conservation news and reports branch, SCS, Washington, D.C.



A resident of the Abilene State School in Texas carefully harvests the seeds from a skeletonleaf gold-eye plant.

Wastewater Gets the Treatment

by Bill Saalman

St. Petersburg, a progressive city of 240,000 on Florida's suncoast, is undertaking a unique water conservation program in its quest for a reliable public water supply. The new program could save as much as 40 percent of the city's daily consumption of potable water.

All of the city's drinking water, which amounts to 40 million gallons per day, is imported from wells located up to 60 miles away. In dry weather, as much as 30 percent of the daily drinking water supply was being used for irrigating lawns. It had been projected that at this usage rate, St. Petersburg would have adequate drinking water supplies only through the year 2020.

To help stretch its potable water supply, St. Petersburg adopted a program to recycle treated wastewater for spray irrigating the city's green spaces. The plan included building four secondary sewage treatment plants and an 82-mile distribution system to deliver the recycled wastewater. So far, two of the treatment plants and about 25 miles of the distribution system are completed. The entire project, which is to be completed by 1983, will be able to treat 66 million gallons of wastewater per day and will provide enough water to irrigate 2,500 acres.

At the plants, the wastewater goes through grit removal, aeration, clarification, multimedia filtration, flash chlorination, and a retention basin that has facilities for additional chlorination when needed. In periods when the demand for irrigation water is low, it will be pumped into deep saltwater wells for storage and reuse. This will insure that no discharge reaches surface waters.

The recycled water has no odor, and viruses are at a nondetectable level.

The nitrogen and phosphorus content of the wastewater is retained, reducing the need for fertilizer in areas irrigated with the effluent.

To insure that a mixture of potable water and recycled water cannot occur under any conditions, the recycled water is distributed through an entirely separate system identified by its brown hydrants. All fittings, threads, and other parts are different from those for the city's potable water system.

Sludge produced by the secondary wastewater treatment plants is being hauled by tank trucks and applied to public and private lands. Much of the sludge is trucked to a holding lagoon and pumped through high volume irrigation guns to a large area of land used for testing different grasses as receptors of sludge. Most of the area is in bermudagrass. But stargrass, for example, seems to have a good potential for heavy growth and nutrient uptake. An open drain that surrounds the site catches surface runoff. Excess water is pumped to a wooded area to prevent discharge into Tampa Bay.

Since the city's inception of the wastewater recycling system in 1971, the Soil Conservation Service has provided technical assistance on the project through the Pinellas County Soil and Water Conservation District. In 1978, SCS entered into a mutually beneficial Interagency Personnel Agreement (IPA) with St. Petersburg. Through this kind of agreement, an SCS employee is temporarily assigned to work closely with another agency on a special conservation project, providing technical assistance and other help.

SCS has helped the city choose plant materials and determine their moisture needs and helped with soil inter-

pretations, irrigation management, sanitary engineering, and public information programs. Through the project, SCS is gaining insight into the nutrient benefits of treated wastewater for soil and plant life, sludge management, and the economics of water reuse and is gaining an awareness of virus control. Funding for St. Petersburg's wastewater recycling system has been a joint effort between the city and the U.S. Environmental Protection Agency.

Now, parks, schoolgrounds, golf courses, median strips, lawns of private residences, and commercial and industrial sites in St. Petersburg are being irrigated with nutrient-rich treated wastewater. Recognizing the city's achievement, the National Society of Professional Engineers chose the water recycling project as one of its "Ten Outstanding Engineering Achievements of 1976."

In St. Petersburg, saltwater intrusion on the city's surficial aquifer and the scarcity of lakes and streams make treated wastewater the only dependable source of irrigation water. Also, using the recycled wastewater for irrigation postpones the day the city will need new potable water pumping and transmission facilities. This type of water conservation program could work in many of the country's water-short areas.

Mr. Saalman is a soil conservationist, SCS, St. Petersburg, Fla.

Three Hats Fit as Well as One

by Justus V. Baum, Jr.

There is a saying about wearing too many hats, but Charles Gardner of Lycoming County, Pa., does not think it is true. Gardner is a farmer, a Lycoming County Conservation District director, and a Franklin Township supervisor. In his opinion, he does better in any of the three jobs because of the other two.

"I can be a better supervisor because I understand farmers and their problems; I am a better director because I understand what is happening to the resources in my area; and I am a better farmer because of all I learn from other farmers that I contact," he explained.

Gardner first learned about conservation practices in the 1950's when a neighbor installed diversions. Whenever it rained, Gardner could be found on his neighbor's farm checking the diversions to see if they were doing their job. What he saw was runoff safely diverted around his neighbor's barnyard and cropland, erosion successfully controlled, and the township road protected.

He was convinced that diversions would work on his farm, part of which lay in a large basin scarred by gullies 2 to 3 feet deep. Before he installed the diversions on his farm in 1958, a 21-inch pipe could hardly handle the runoff at the lower end of the basin where the drainage crossed the township road. After he installed the diversions and contour strips, even runoff from major storms didn't fill a 15-inch pipe and no gullies were formed. This was a lesson that would help him as a township supervisor.

"It's called stormwater management today," Gardner commented; "but whatever it's called, it works."

Franklin Township, in eastern Lycoming County, is mostly hilly farm country

Five years ago, this was a rundown, gully-ridden farm. Because of the influence of Charles Gardner, with technical help from SCS, the gullies have been healed and the farm restored to productive use.



with some large, scattered woodlots and one small village. With an average rainfall of 42 inches a year, the township has frequent problems with water runoff. When the rain comes, it comes fast causing a lot of headaches to the 48 miles of township roads.

"Another seasonal problem is frost and underground springs creating large soft areas in the township's roadbeds," Gardner said. "These become booby traps to cars and trucks and require a good Samaritan to come along and pull the unfortunate motorist out of the mud.

"These are the kinds of problems we faced when I first became a township supervisor back in 1951," said Gardner. "Shortly after that, I became acquainted with the people from USDA's Soil Conservation Service. From the experience I gained on my own farm, I was convinced that the same principles that I applied as a farmer in managing soil and water could be used in my work as a township supervisor.

"One of our goals was to rebuild the township roads to make them safer and to eliminate the wet areas," Gardner continued. "Whenever a township road section was rebuilt, a meeting was held with all the landowners along the way: First, to tell them of our plans and, second, to sell them on the idea of installing a complete surface water management system on their land. We urged them to become cooperators with the Lycoming County Conservation District so that they could receive the services of SCS in installing conservation practices. We also encouraged them to participate in the programs of USDA's Agricultural Stabilization and Conservation Service (ASCS) for cost-sharing assistance.

"The township improvement plans were prepared in conjunction with the farms' surface water management. Road culverts were placed to connect with the farmers' diversions or meet their diversion outlets. With this cooper-

SCS District Conservationist Justus Baum (left) and Gardner examine crownvetch seeding on a township roadbank. Gardner estimates that roadbank seeding saves the township \$100 to \$200 per mile each year in road maintenance costs.



ative approach, the township supervisors have never had a problem obtaining rights-of-way from landowners. The supervisors feel that this way they help both the farmer and the township."

Gardner is convinced that this really happens. He estimates that in 1972 during flooding caused by Hurricane Agnes and again in 1975 when the effects of Hurricane Eloise were felt, the township saved thousands of dollars in road damage simply from the diversions on the farmland which also protected the township roads. While patrolling the roads during the storms, Gardner observed that farms with conservation practices—stripcropping, diversions, and seeded pasture and hayland—had no significant increase in runoff during the storms.

The other township supervisors, Leroy Whitmoyer and Robert Ditzler, were amazed at the results. Today, they spend almost as much time as

Gardner helping to achieve these improvements. The township supervisors point with pride to the fact that at least 20 of the soft spots in the roads have been eliminated with the surface water management in combination with underground drains and stone.

Because of his interest in conservation, Gardner was also appointed to the board of directors of the Lycoming County Conservation District. Gardner finds that he can carry out district activities at the same time as he is carrying out township responsibilities. For example, one spring Gardner sold 135,000 tree seedlings for the conservation district in less than 1 day while contacting landowners about township business.

In addition, the township supervisors strongly encourage farmers to develop springs for useful purposes, such as livestock water and in some cases domestic use. This practice also keeps the water from reaching the township right-of-way and becoming a road maintenance problem.

With his farm experience, Gardner could see that proper grading and seeding of township roadbanks would save money. In the 1960's, the township began a regrading and seeding program which Gardner estimates now saves the township \$100 to \$200 per mile each year on road maintenance where the seeding work has been completed.

Another project that the township supervisors point to with pride is the new municipal building area in Lairdsville. The building is located on a tract of land adjacent to the elementary school and the volunteer fire company. Through a cooperative project with both of these community groups and with the

assistance of SCS, a complete surface and subsurface water management system was installed. As a result, a recreation area with a ballfield, playgrounds, and a site for the fire company's annual carnival now stands on previously unused land. The practices include extensive underground drainage, spring water drainage, stormwater diversions for surface water, waterway outlets, drop inlet structures, seeding, and a proposed underground gravity-fed water storage system for the volunteer fire company.

"We cannot help but feel some pride in how much we as township supervisors have been able to stretch the tax dollar to get as much done as we have," Gardner said.

"We feel, with technical assistance from SCS, the landowners' financial assistance from ASCS, and our ability to get the job done, we are making the township a better place in which to live," he added.

As he looks back on all of the achievements of the past 20 years, Gardner says proudly, "I really feel that I can wear more than one hat and help not only myself but also the people in my township and county."

Mr. Baum is district conservationist, SCS, Williamsport, Pa.

Making 208 Work

by Katherine C. Gugulis

Two years ago, the 5,000-acre Dragon Creek watershed in New Castle County, Del., was a soil conservationist's nightmare. The erosion rate was one of the highest in the county. Almost 45 percent of the land was corporate-owned and rented to farmers on a year-to-year basis. Conservation practices were nearly nonexistent.

Today, after a crash program by the New Castle Conservation District, the watershed is being touted as a conservation success story. The National Association of Conservation Districts has called it a model program—and with good reason.

About 92 percent of the watershed is now covered by conservation plans. All but one of the 23 landowners have become conservation district cooperators. Where 2 years ago conservation practices were nearly nonexistent, there are now 722 acres of conservation cropping systems; 427 acres of cover crops; 1,062 acres of crop residue management; 613 acres of chiseling and subsoiling; 1,437 acres of conservation tillage; and 555 feet of diversions. The erosion rate has been cut by more than half. And much more conservation work is underway.

How did all this happen?

While some agencies were looking for reasons not to get involved in the planning for nonpoint source pollution control, as mandated by Section 208 of the Federal Water Pollution Control Act Amendments, New Castle Conservation District leaped at the opportunity to use a new tool in getting conservation on the land.

How do conservation practices affect water quality? Studies show that after point sources of water pollution are controlled, 90 percent of all suspended solids in waterways will originate from nonpoint sources. Sediment is the single major source of nonpoint source pollution in the United States and most of it washes off unprotected cropland.

In 1977, New Castle became the first conservation district in the Nation to establish its own voluntary agricultural 208 water quality program.

With a \$28,000 grant from the U.S. Environmental Protection Agency (EPA), the district hired a 208 staff headed by part-time coordinator Martin Gordon, a retired Soil Conservation Service district conservationist with plenty of experience in conservation planning. In addition it hired Clement Hathaway as a full-time planner who was later joined by Tom Jenkins, conservation technician.

The team's approach—a combination of low-key salesmanship and persistence—obviously paid off. What pointers do they have for others faced with similar situations?

First, the team members targeted their efforts to a specific geographic area. They concentrated on Dragon Creek watershed because of the high rate of erosion, its manageable size, and the complexity of owner/operator relationships. By directing their efforts to



Martin Gordon (left) and Richard Brush, former SCS district conservationist for New Castle County, inspect a gully on cropland rented out by industry. Farmers with short-term leases from industrial landowners had little incentive to invest in practices with long-term benefits.

a specific watershed, they were better able to set goals and measure progress. "We thought if we could succeed with Dragon Creek, our approach would work anywhere," said Gordon.

Their next big hurdle, one shared by most conservationists, was convincing the land owners and operators to invest in conservation measures. This proved particularly difficult in Dragon Creek since so much of the land was owned by corporations with little economic interest in conserving the soil. To them, the major value of the land was as a buffer between their plants and surrounding communities. Meanwhile the farmers who rented the land, because they had no long-term leases, were leary of investing in practices that had long-term benefits.

Although the 208 team wasn't able to rectify the short-term lease problem, they were able to get the landowners and the renters to discuss the situation with each other. "The corporations' land managers indicated that they were satisfied with their leasing arrangements and could foresee no reason to change in the near future," explained Gordon. "This gave some of their renters the assurance they needed to invest in conservation measures."

Acceptance, however, didn't come easy. That's where the persistence paid off. "After we first talked to officials at one of the corporations, a petroleum company, they thought they'd never see us again," said Gordon. "They were really surprised when we came back with soil information and conservation plans that we had developed with their renters. Eventually, after we explained what was needed and wanted, the corporation officials agreed to cooperate with the district.

"Even with the farmers, we had to go back often to gain their confidence," said Gordon. When explaining their program to farmers, the 208 staff avoided pressure and scare tactics. They emphasized the production benefits of conservation first. Later they mentioned its beneficial effects on water quality.

Also key to the success of their program was the formation of a 10-member farmer's advisory committee. One of the first duties of the committee was to decide which of the 10 best management practices would receive the highest priority and to devise a practical approach to the effort. This way, local people decided for themselves what was needed and feasible. Having some of the leading farmers and landowners on the committee also helped the 208 staff gain acceptance by others in the watershed.

The success of New Castle's 208 program is not measured in numbers alone. It helped generate a kind of community spirit about conservation. At a luncheon sponsored by the district in appreciation of the cooperation given to the team, 29 of the 33 invited cooperators attended.

EPA officials have also expressed their approval. They nearly doubled the original grant for the 208 staff to carry out its program in the larger Appoquinimink watershed.

Predicts Gordon, "With as much success as we've had in Dragon Creek, we'll have even more in Appoquinimink."

Ms. Gugulis is public information officer, SCS, College Park, Md.

Jack Wiley's Story

Jack Wiley, a farmer in the Dragon Creek watershed, tells his own 208 success story. Encouraged by the 208 staff, Wiley became the first farmer in the watershed to experiment with conservation tillage.

"I had thought a lot about no-till," said Wiley. "Then Martin Gordon and his crew came along and sold me on it." So he bought a no-till planter and learned how to use it.

At first, he was skeptical. "We put the corn in and I thought it would never come up it was such a cold, wet spring. A lot of my neighbors would come by and comment that it looked like a big mess."

Despite the slow start, Wiley's first 50 acres of no-till corn yielded 162 bushels an acre—a significant 17-percent increase over his conventionally planted corn. In 1979, he planted 250 acres of no-till corn.

According to soil conservationists, conservation tillage can reduce erosion by up to 80 percent, thereby decreasing significantly the amount of sediment entering streams.

Although Wiley recognizes the moisture conserving benefits of conservation tillage, he says his main concern was trying to prevent erosion and to save energy and labor. In the 1 year that the 208 team stepped up planning efforts, he also installed several waterways and a diversion terrace to control water and prevent erosion.

Now a firm believer in soil conservation, Wiley says, "Nowadays it's nice, following a big rain, to go out into a field where there was a wash and always had been a wash to see that what I planted is still there."

MIP on Broadway

Clean Water Models, Part 3

by Steve Foland

This is the third and final part of a series on the seven Model Implementation Projects (MIP's) going on throughout the United States (see the October and November 1979 issues for parts 1 and 2). The MIP's are a 3-year test to demonstrate how concentrated cost sharing and technical assistance by the U.S. Department of Agriculture and the U.S. Environmental Protection Agency can help solve agriculture-related water quality problems. The South Carolina and South Dakota MIP's are described here.

A wide swath of about 25,000 acres of mostly red clay in Anderson County, S.C., makes up the Broadway Lake watershed. The watershed, which has a long history of erosion and sediment problems, was chosen as a Model Implementation Project (MIP) area to demonstrate to landowners how conservation practices can keep soil from washing away and polluting the lake.

The 300-acre Broadway Lake is just outside Anderson in the northwestern part of the State. The manmade lake is one of Anderson County's oldest recreation sites. The lake was built as part of a Work Projects Administration (WPA) project in 1938 at a site where many small streams merged. About 80 acres, or more than one-fourth, of the lake is now completely silted in. Along with the sediment, agricultural chemicals and animal waste have been running off farmland and into the lake for many years.

For more than a century, clean-tilled cotton was the dominant crop in the county, but it has been replaced by soybeans, corn, and other crops. "Cotton was a pretty bad crop for soil erosion," said District Conservationist George Watkins of the Soil Conservation Service, "but its replacements are not much better. We still have mostly a one-crop system around here. It's beans, beans, beans . . . year after year. The rolling hills in the watershed require entire management systems, such as terracing, minimum tillage, and good crop rotations to control erosion."

The major conservation needs identified in the project proposal for the watershed included treatment of 170 acres of critically eroding land. Critical area treatment involves smoothing gullies and eroding roadbanks and planting them to grasses or trees, or both.

Watkins said there is also a need for approximately 25 debris basins in the watershed to catch and store sediment, 10 animal waste lagoons, and other agricultural waste management systems. The project calls for accelerated assistance to landowners in planning and applying terraces, grassed waterways, pasture planting, stripcropping, field borders, minimum tillage, and timber stand improvement.

SCS is providing technical assistance to landowners in planning, designing, and applying conservation practices. USDA's Agricultural Stabilization and Conservation Service is providing funds for cost sharing on the practices through the Agricultural Conservation Program. "The voluntary response to the project," said Watkins, "has been very good. It sure helps when we can offer as much as 90 percent cost

sharing. We especially hope to increase the acreage of minimum tillage, stripcropping, and crop rotations."

Edward Drake is one Broadway watershed landowner who is well along with his conservation work. Watkins and his staff helped Drake prepare a conservation plan for his land and he began right away to apply the plan's recommendations. As Drake put it, "I saw that I was losing too much of my soil and I was tired of driving my tractor across gullies." He has already sloped and seeded 2 acres of grassed waterways and constructed 25,000 feet of terraces and 1,100 feet of diversions. "These practices, along with my crop rotations that include some minimum tillage plantings, should bring my soil losses down to reasonable limits," said Drake.

For the Broadway Lake MIP, the U.S. Environmental Protection Agency (EPA) is providing funding for employing a project coordinator from the South Carolina Land Resources Conservation Commission. Through the Clean Lakes Program (Section 314 of Public Law 92-500) EPA is also providing funding for roadside erosion control.

USDA's Science and Education Administration-Extension, the Anderson Soil and Water Conservation District, the

South Carolina Commission of Forestry, the South Carolina Highway Department, and the South Carolina Department of Health and Environmental Control are cooperating in the MIP effort.

With EPA funding, the South Carolina Department of Health and Environmental Control and Clemson University have set up monitoring equipment in four small streams leading into Broadway Lake. The monitoring stations will provide basic information concerning water quality and help measure the effects of conservation treatment on the land upstream.

George Watkins said conservation measures are being applied on much of the land in the MIP area that is drained by streams flowing into the lake. He added that keeping the soil where it belongs will help keep the lake's water clean and cut down on sediment and other pollutants carried by streams above the lake.

Mr. Foland is chief, conservation news and reports branch, SCS, Washington, D.C.



Because of erosion problems in the Broadway Lake watershed, streams carried heavy loads of sediment and other pollutants to the lake. Conservation practices applied through the MIP to control erosion will help restore water quality.

Saving a Lake Called Herman

by Joyce S. Watkins

"I want to help the lake," said Irene Tyrrell, a widow whose farm is in the Lake Herman watershed. Many other people in the southeastern South Dakota community of Madison say they feel the same way.

Lake Herman is a shallow, natural lake with an average depth of 8 feet. The lake has a surface area of 1,350 acres and a watershed area of 44,670 acres. About 75 percent of the watershed is in cropland and about 15 percent is used for pasture and range. The major crops are corn and small grains which support livestock operations.

About 70 families live along the shores of the lake, and the State 4-H camp and Lake Herman State Park lie along the rest of the shoreline. In 1976, more than 325,000 people visited the park for fishing and recreation. But, as water quality in the lake deteriorated, local residents watched the number of visitors dwindle to 173,000 last year.

The main water quality problem in the lake is sediment loading. Most of the sediment enters the lake by four major tributaries that flow into it. The main source of the sediment is agricultural activities around the tributaries. Also, the shallowness of the lake contributes significantly to the water

quality problems because wind action continually stirs up the sediment.

A task force was established to plan the rehabilitation of the lake when it was chosen as a site for a Model Implementation Project (MIP) in 1978. The Lake County Conservation District is sponsoring the MIP and many Federal, State, and local agencies are cooperating in the effort. The South Dakota Department of Water and Natural Resources appointed an MIP coordinator, Tim Bjork. Bjork works out of the conservation district office and his position is funded by the U.S. Environmental Protection Agency (EPA).

It was determined that applying and maintaining conservation practices in the drainage area, including the construction of several sediment control dams, was the most effective method for treating sediment and nutrient loading in Lake Herman. USDA's Soil Conservation Service is providing technical assistance to landowners in the watershed in applying conservation practices, and EPA is providing some funding through the Clean Lakes Program (Section 314 of Public Law 92-500). USDA's Agricultural Stabilization and Conservation Service (ASCS) made Agricultural Conservation Program (ACP) funds available to landowners in the watershed. As much as 90-percent cost sharing is available on some practices.

Word of the cost sharing spread quickly—through public meetings, special mailings, and local print and broadcast media. SCS District Conservationist Oakley Hoy, SCS Soil Conservation Technician Ron Adamson, and MIP Coordinator Tim Bjork teamed up to help watershed farmers put more conservation on the land to help save Lake Herman. The landowners were very cooperative. Through past efforts of SCS and through the MIP, by 1978 about 75 percent of the drainage area into the lake was adequately treated. Practices applied included terraces, contour farming, conservation tillage, grassed waterways, and conservation cropping systems.

Chairperson of the Lake County Conservation District, Vern Spartz, said, "I can see a difference in the lake already, since the conservation work was begun. Maintenance of the practices, coupled with the sediment retention dams, should extend the life of the lake by many years."

So far, five small dams have been built. One is on land farmed by two brothers, Orris and Alden Jung, who live along the lake. The dam holds sediment and other pollutants back and also stores water for livestock.



Tim Bjork, MIP coordinator, records data from the automatic samplers installed along the tributaries to Lake Herman.

Another dam is on Albert Vanhove's farm. Even though the stockwater dam SCS designed for him will cost about \$1,000 above the cost sharing he will receive, Vanhove is proceeding with the plan. His dam will hold back about 18 feet of water. The semiretired farmer, an avid hunter and fisherman, will gain more than stockwater and pollution reduction from his dam: He will also gain a pond he can stock with bass.

Irene Tyrrell's farm is about 3 miles from the lake. She had a wildlife pond installed and maintenance work done on her terraces to insure that no sediment or other pollutants from her land reach the lake.

As conservation practices are applied in the watershed, an extensive program is underway to monitor lake water quality. In 1978, monitoring was limited to some tributary and inlake sites. But now, the monitoring program covers the four main tributaries and their drainage areas as well as inlake sites.

Samples of the lake water are taken at three sites from a pontoon boat leased from Dakota State College. At each site, samples are taken of surface, middepth, and bottom lake water. The monitoring will help determine how effective the conservation practices are in reducing erosion. The Remote Sensing Institute and USDA's Science and Education Administration-Agricultural Research are also helping to monitor water quality in the lake and to determine the sources of sediment still needing treatment.

Under a contract between the Dakota State College and the conservation district, Liza Knox, a student at the college, is helping MIP Coordinator Bjork with some of the inlake sampling and biological analysis. The State Health Laboratory is conducting chemical analysis of the lake water.

In September 1979, construction began on two sediment retention dams designed by SCS. A third one is scheduled to be built in 1980. At the dams, researchers will test the effects various detention periods have on nutrient deposition.

Looking to the future of Lake Herman, Bjork said, "We hope dependable fishing can be brought back to the lake, as well as the other recreational benefits. We hope that the eutrophication process can be slowed down. The people in the community enjoy the lake and we are all working together to save it."

Ms. Watkins is public information specialist, SCS, Huron, S. Dak.

District Says Thanks

Vern Spartz, chairperson of the Lake County Conservation District, said, "This community is pleased with the action taken under the MIP. Many studies have been done on the lake in previous years, and it is refreshing to see efforts combined and action being taken. There have been a lot of personal services and monetary contributions to this project. It is the local interest and support that has made the Lake Herman MIP a success."

As the project sponsor, the conservation district says thanks to:

Dakota State College;
Lake County Commissioners;
Lake Herman Development Association;
Madison City Commissioners;
Cooperative Extension Service;
First Planning and Development District;
East Dakota Conservancy Sub-District;
Old West Regional Commission;
Remote Sensing Institute;
South Dakota Department of Agriculture, Division of Conservation;
South Dakota Department of Game, Fish, and Parks;
South Dakota Department of Water and Natural Resources;
State Conservation Commission;
U.S. Environmental Protection Agency;
USDA's Agricultural Stabilization and Conservation Service, Economics, Statistics, and Cooperatives Service, Farmers Home Administration, Science and Education Administration, and Soil Conservation Service; and other support groups.

News Briefs

Final Rules Announced for Flood Plain Management and Protection of Wetlands

New steps by USDA's Soil Conservation Service to protect valuable wetlands and avoid encroachment on flood plains were announced by Assistant Secretary of Agriculture for Natural Resources and Environment M. Rupert Cutler.

Two separate rules direct SCS personnel to use the agency's technical assistance programs to encourage sound wetland and flood plain management decisions by land users.

Cutler said the rules will strengthen SCS's commitment to the protection of wetlands and wise management of flood plains.

All department agencies that administer grants, loans, regulations, or technical assistance programs have been ordered to review their actions and change them where needed, Cutler said, to prevent excessive loss of agricultural land or wetland and to avoid further encroachment onto flood plains.

The agencies also have a positive obligation, Cutler said, to provide landholders and other concerned people information about the alternatives to—and the environmental, social, and economic implications of—proposed actions.

SCS provides technical assistance to land users primarily on non-Federal land through local conservation districts and other State and local agencies. As an example of how the assistance will change, Cutler said in the future SCS will insure that its technical assistance will not lead to the unnecessary conversion of the land to nonagricultural uses.

SCS prepared the flood plain management rules in consultation with the Water Resources Council, the U.S. Department of Housing and Urban Development's Federal Insurance Administration, and the Council on Environmental Quality. It prepared the final rules on protection of wetlands with the aid of written comments from numerous other Federal, State, and private agencies.

Less Developed Countries to Receive Technical Soil Assistance

The U.S. Department of Agriculture will provide permanent personnel to help less developed nations conduct soil surveys in their countries, according to Norman A. Berg, administrator of the Department's Soil Conservation Service.

Under an agreement with the State Department's Agency for International Development, SCS will assign agricultural experts for short terms to help identify and categorize soils in tropical and subtropical countries according to an international system of classification. The technical assistance will help the countries conserve and better manage their soil, water, and related resources.

The agreement represents the first time that USDA has assigned permanent staff to assist with soil studies in foreign countries. Previously, the Department provided assistance on a country-by-country basis as needed. The new approach will not only improve soil management in countries outside the United States, but will also help with the transfer of technology from one country to another, Berg said.

Six New RC&D Areas Approved for USDA Assistance

Six new Resource Conservation and Development (RC&D) areas, covering more than 22 million acres in 40 counties and Puerto Rico, are now eligible for RC&D assistance from the U.S. Department of Agriculture, according to Secretary of Agriculture Bob Bergland.

The areas are located in Alabama, Georgia, Idaho, Iowa, West Virginia, and Puerto Rico.

Objectives of the locally sponsored RC&D areas are to improve the use of each area's natural resources; improve and expand economic, cultural, and recreational opportunities for local residents; and enhance the environment.

RC&D area sponsors include county governments, conservation districts, and municipal governments. Many other interested organizations endorse and support these efforts, and USDA provides technical and financial assistance to carry out the resource conservation and development activities in these locally administered areas.

Addition of the six areas will make a total of 184 areas now authorized for assistance. The Soil Conservation Service has USDA leadership for the RC&D Program.

The areas include:

- CAWACO area, Alabama: Blount, Chilton, Jefferson, Shelby, and Walker Counties;
- Oconee River area, Georgia: Barrow, Clarke, Elbert, Greene, Jackson, Madison, Morgan, Oconee, Oglethorpe, and Walton Counties;

Book Reviews

- East Central Idaho area, Idaho: Butte, Clark, Custer, Fremont, Jefferson, Lemhi, Madison, Teton, and part of Bonneville Counties;

- Pathfinders area, Iowa: Davis, Jefferson, Keokuk, Mahaska, Wapello, and Van Buren Counties;

- Great Kanawha area, West Virginia: Boone, Cabell, Clay, Kanawha, Lincoln, Logan, Mason, Mingo, Putnam, and Wayne Counties;

- El Caribe area, Puerto Rico: the southwestern part of Puerto Rico, including the cities of Ponce and Mayaguez, and the soil conservation districts of Caribe, Oeste, Sudeste, Sur, and Suroeste.

Properties and Management of Forest Soils.

William L. Pritchett, 1979.
John Wiley & Sons, New York.
500 pp., illus., \$21.

This book provides a good overview of current thinking and activities related to soils under forests. It is intended for advanced students in forest soil science and foresters, and is useful in the United States and many other parts of the world.

Part I presents information on properties and dynamic processes in soils under forests. Its 13 chapters describe: (1) development of soils and forests, (2) types of soils associated with major forest biomes worldwide, (3) composition and biology of the forest floor, (4) chemical and physical properties, and (5) hydrology and the integrated effect of properties on site productivity.

Part II delves into management and its consequences. These last 10 chapters mention various systems to classify forest lands and describe silviculture and nursery management. The book gives special attention to the effects of intensive management on long-term productivity as well as on soils under short-rotation plantations. Also covered are special needs with problem soils; chemical treatments for fertilization, pests, and disease; and the effects of fires.

Pritchett's chapters are specific and well organized, and the index provides an excellent cross-reference.

—Richard W. Arnold, soil scientist,
SCS, Washington, D.C.

Soil Survey Contracts and Quality Control.

S. Western, 1978. Oxford University Press, Oxford, England. 284 pp., illus. (b&w), \$32.50.

This book is a valuable reference for soil survey organizations and agencies or individuals requesting a soil survey. It describes how to plan soil survey projects and how to negotiate contracts for their completion. Special emphasis is given to organizational and personnel problems associated with making soil surveys under unfamiliar conditions in foreign countries.

Western offers suggestions to contractors on how to interpret the requestor's needs in order to develop specifications for the survey, and how to determine how much to charge the requestor for the type of soil survey required. The author also provides information on the problems of quality control in soil surveys.

Each of the eight chapters discusses a segment in the planning and execution of a contract soil survey, from the contracting through the reporting stages.

Western draws upon his extensive experience as a soil survey contractor in several countries for his discussion of topics such as negotiations, liaison, and contract documents. The appendix contains "how-to" sections on proposal preparation and contract agreements.

—Richard L. Guthrie, soil scientist,
SCS, Lanham, Md.

Learning Through Scouting

by Walley Turner

Enjoying camping, swimming, canoeing, and archery with youths their own age is popular with Boy Scouts. But along with the fun, Boy Scouts of America programs are designed to teach about the environment and about the wise use and conservation of our natural resources. Reaching this goal is part of the merit badge program.

Since Scouts are required to master a subject well to earn a merit badge, the Palmetto Boy Scout Council of South Carolina sponsors a special, week-long summer camp to help Boy Scouts work on merit badges dealing with natural resources. The workshop is held just over the State line in North Carolina at Camp Palmetto near the town of Saluda, N.C., and has been held there every summer since 1975.

Instruction at the camp includes soil and water conservation, fish and wildlife management, forestry, geology, weather, and nature study. In addition to the Palmetto Council's staff, resource professionals from the Soil Conservation Service, the Forest Service, and the

South Carolina Department of Wildlife and Marine Resources help Scouts gather information and acquire the skills necessary to earn merit badges in natural resources.

SCS in South Carolina assigns one of its most recently hired soil conservationists to work with the Scouts at Camp Palmetto. The new employees are usually young and can relate well to the Scouts. It also gives the new employee experience in working with youth organizations.

For example, last year SCS Soil Conservationist Dennis Woodson from Greenville, S.C., taught soil and water conservation at the camp. He set up demonstrations to show the effects precipitation, erosion, percolation, transpiration, and the capillary action of water have on soil. The Scouts were also required to be familiar with the contents of a soil survey. Field studies include comparing soil survey descriptions of soil in the camp with actual auger borings taken of soil in the area.

Part of the instruction about soil at

the camp includes practice in determining the pH of different kinds of soil, and to learn why applying lime and fertilizer is sometimes necessary. The Scouts also learned how to manage small bodies of water for fish production and how to test pond water quality for its ability to support plant and animal life.

Scouts also worked on a field project that combined learning and action. The boys helped build a check dam to slow water that was washing fill material off a nearby stream culvert. Through the hands-on experience the Scouts learned how to plan and complete a conservation project and to help solve an erosion problem at the camp.

The Scouts went to the Pisgah National Forest to study forestry and fish and wildlife management, and to learn how to identify different kinds of trees. The Department of Wildlife and Marine Resources arranged studies of wildlife common to the area and how to improve and protect wildlife habitat. A day-long tour included stops at a Forest Service ranger station, a U.S. fish hatchery, and the Cradle of Forestry near Brevard, N.C.

"Helping Scouts at Camp Palmetto learn about conserving our natural resources is conservation education in action," said Woodson. "The camp and its surroundings lend themselves well to teaching conservation in the outdoors.

"The greatest reward for me in working with the Scouts is helping young men and boys learn about the world they live in and what they can do to maintain and improve the environment."



Instruction about soils at Camp Palmetto includes practice in finding the pH of different soils in the area. The Scouts are challenged to find relationships between various soil characteristics and some common land treatment practices such as liming and fertilizing.

Mr. Turner is district conservationist,
SCS, Greenville, S.C.

New Publications

Proceedings of the 1979 Irrigation Technical Conference

by The Irrigation Association

The Irrigation Association has published the proceedings of the 1979 Irrigation Technical Conference which took place February 18-21, 1979, in San Francisco, Calif.

The 191-page, illustrated volume contains presentations focusing on the conference theme, "Water, Water Everywhere—But Can We Use It?" Included in the proceedings is the discussion of the President's water policy, water conservation in the United States, and the outlook for irrigated agriculture in California. Other sections consist of agricultural irrigation, turf/landscape irrigation, and drip/trickle irrigation. Special emphasis is given to the use of waste effluent in turf and landscape applications, low-pressure irrigation for agriculture, reduction of energy requirements in irrigation, the use of infrared photography in system design, and other timely subjects.

The proceedings are available for \$12 per copy.

Cassette recordings of the conference are also available at \$80 for a 12-tape set. The drip/trickle album containing three tapes is \$27 per set; the turf album of three tapes is also \$27; and the agricultural album is \$32 for a 4-tape set.

Prepaid orders for both the proceedings and the tapes may be sent to The Irrigation Association at 13975 Connecticut Avenue, Silver Spring, Md. 20906.

Meetings:

December

2-5	American Society of Farm Managers and Rural Appraisers, Inc., Chicago, Ill.
3-7	American Geophysical Union, San Francisco, Calif.
3-7	Symposium on Surface Mining Hydrology, Sedimentology and Reclamation, Lexington, Ky.
4-7	Western Forestry Conference, Spokane, Wash.
6	Keep America Beautiful, Inc., New York, N.Y.
10-14	American Society of Agricultural Engineers, New Orleans, La.
28-30	American Agricultural Economics Association, Atlanta, Ga.

January

3-8	American Association for the Advancement of Science, San Francisco, Calif.
6-10	American Farm Bureau Federation, Phoenix, Ariz.
7-11	North American Game Breeders and Shooting Preserve Association, Orlando, Fla.
13-14	Land and Water Conservation Exposition, Des Moines, Iowa
17-21	National Wool Growers Association, San Diego, Calif.
21-25	National Cattlemen's Association, San Diego, Calif.

February

10-14	National Association of Conservation Districts Convention, Houston, Tex.
11-15	Society for Range Management, San Diego, Calif.
15-18	American Association of School Administrators, Anaheim, Calif.
20-23	Land Improvement Contractors of America, Phoenix, Ariz.
23-27	The Irrigation Association Technical Conference, Houston, Tex.

Soil Surveys Published

Connecticut: New Haven County.

Florida: Osceola County.

Georgia: Brooks and Thomas Counties.

Illinois: Kane County and Kankakee County.

Indiana: Miami County.

Iowa: Lee County.

Kansas: Kingman County and Sedgwick County.

Massachusetts: Nantucket County.

Michigan: Clare County.

Missouri: Knox, Monroe, and Shelby Counties.

Nebraska: Boyd County.

New Jersey: Warren County.

New York: Schuyler County and Ulster County.

Ohio: Mercer County.

Oklahoma: Atoka County, Carter County, Nowata County, and Washita County.

North Dakota: McLean County.

South Carolina: Anderson County.

South Dakota: Tripp County and Yankton County.

Texas: Blanco and Burnet Counties, Cooke County, Lamar and Delta Counties, and Walker County.

Wisconsin: Jefferson County.

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